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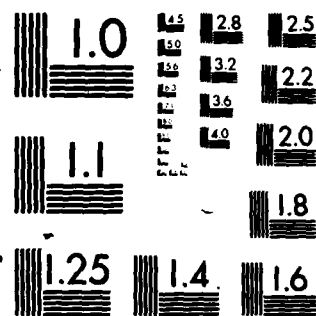
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MICROWAVE ACOUSTICS HANDBOOK. VOLUME 3. BULK WAVE VELOCITIES.(U)
MAY 80 A J SLOBODNIK, R T DELMONICO

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RADC-TR-80-188-VOL-3

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MICROWAVE ACOUSTICS HANDBOOK VOLUME 3, BULK WAVE VELOCITIES

A. J. Slobodnik, Jr.
R. T. Delmonico
E. D. Conway

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER RADC-TR-80-188- <u>vol-3</u>	2. GOVT ACCESSION NO. <u>AD-A090947</u>	3. RECIPIENT'S CATALOG NUMBER <u>9</u>
4. TITLE (and Subtitle) <u>MICROWAVE ACOUSTICS HANDBOOK</u> <u>VOLUME 3. BULK WAVE VELOCITIES</u>		5. TYPE OF REPORT & PERIOD COVERED <u>Final Report</u> <u>November 1971 - April 1980</u>
7. AUTHOR(s) <u>A. J. Slobodnik, Jr.</u> <u>R. T. Delmonico</u> <u>E. D. Conway</u>		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS <u>Deputy for Electronic Technology (RADC/EEA)</u> <u>Hanscom AFB</u> <u>Massachusetts 01731</u>		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS <u>Deputy for Electronic Technology (RADC/EEA)</u> <u>Hanscom AFB</u> <u>Massachusetts 01731</u>		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS <u>2305J501</u> <u>1795</u>
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) <u>12533</u>		13. REPORT DATE <u>May 1980</u>
		12. NUMBER OF PAGES <u>532</u>
		15. SECURITY CLASS. (of this report)
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES An explanation of related volumes is contained in the preface of this document.		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Acoustic bulk wave velocities Coupling to bulk waves Handbook for bulk waves Bulk waves power flow angles Volume wave velocities Piezoelectric crystals Wave propagation Acoustic delay lines		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) - > Information useful for the design of acoustic delay lines, resonators, and other miniature, low cost, reliable devices for use in communications and electronic sensing is given in this report. Computations of bulk acoustic wave velocities, power flow angles, and coupling to electric fields are plotted for various orientations of the following single crystalline materials: $Ba_2NaNb_5O_{15}$, $Bi_{12}GeO_{20}$, CdS, Diamond, $Eu_3Fe_5O_{15}$, Gadolinium Gallium Garnet, GaAs, Germanium, InSb, InAs,		

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7 Lead Molybdate, PbS, LiNbO_3 , LiTaO_3 , MgO, Quartz, Rutile, Sapphire, Silicon, Spinel, TeO_2 , YAG, YGaG, YIG, and ZnO. Particular cuts of interest, including 2 cases for common metals, are then chosen for more detailed numerical calculations of mechanical and electrical parameters governing acoustic wave propagation in these media. A list of material constants is also included.

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Preface

The increasing use of acoustic devices in military systems has prompted the generation of this Microwave Acoustics Handbook series. Other volumes, either published or in preparation, are: Volume 1A, Surface Wave Velocities; Volume 2, Surface Wave Velocities—Numerical Data; and Volume 4, Bulk Wave Velocities—Numerical Data.

The reader is urged to become familiar with the text of this handbook prior to utilization of the curves or printout in order that the notation be fully understood. The authors would, of course, appreciate having any errors or omissions brought to their attention.

The authors wish to acknowledge the support of E. Cronin, J. Cooney and R.G. Gosselin in the compilation of this report. The computer programming assistance provided by R. T. Delmonico and E. D. Conway of ACSI and J. V. O'Brien formerly of Dabovich and Company was obtained under Air Force contract.

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Microwave Acoustics Handbook Volume 3. Bulk Wave Velocities

1. INTRODUCTION

The proper design of acoustic bulk wave delay lines, resonators, and other signal processing devices requires detailed knowledge of bulk wave velocities, pure mode axes, and coupling to external electric fields.

Since anisotropic crystals are necessary for low acoustic loss^{1, 2} at high frequencies, each different cut of every crystal is a special case requiring computer analysis for an exact solution. The addition of piezoelectricity, which is generally necessary to couple from electromagnetic to acoustic energy, adds further complexity to the problem. Nonpiezoelectric substrates are, of course, widely used in conjunction with evaporated thin film piezoelectric transducers.

To eliminate needless duplication among different design groups, the present volume provides this data for various orientations of piezoelectric and non-piezoelectric crystalline materials. This task is accomplished by using the theory and computer programs previously developed by Slobodnik and O'Brien.³ In

(Received for publication 28 May 1980)

1. Elbaum, C. (1969) Ultrasonic attenuation in crystalline solids—intrinsic and extrinsic mechanisms, Ultrasonics: pp 113-116.
2. Oliver, D.W., and Slack, G.A. (1966) Ultrasonic attenuation in insulators at room temperature, J. Appl. Phys. 37:1542-1548.
3. Slobodnik, A.J., Jr., and O'Brien, J.V. (1971) Complete Theory of Acoustic Bulk Wave Propagation in Anisotropic Piezoelectric Media, TR-71-0601, AD739162, National Technical Information Services, Springfield, Virginia 22151.

addition to the information described above, which is presented in graphical form over a wide range of orientations, particular cuts of interest are selected for more detailed numerical calculations. Also included are computations for common metals.

The next section outlines the complete theory of acoustic bulk wave propagation in anisotropic piezoelectric media, Section 3 provides bulk wave velocity and power flow angle curves, while the detailed numerical data mentioned above is given in Section 4. Finally, the material constants used in these studies are provided in Section 5.

2. THEORY OF ACOUSTIC BULK WAVE PROPAGATION

2.1 Introduction

The purpose of this section is to provide a complete theoretical solution of the problem of acoustic bulk wave⁴⁻⁶ propagation in arbitrary, anisotropic piezoelectric media. This is accomplished by solving the continuum equations of motion together with Maxwell's equations under the quasi-static assumption, the strain-mechanical displacement relations, and the piezoelectric constitutive relations. These are all, of course, in tensor form.⁷ Since one-dimensional propagation is assumed, several simplifications will be possible and boundary conditions are not present. The complete solutions obtained here will allow generation of the curves and numerical data of the following sections.

The general approach followed here very closely parallels the surface wave work of Campbell and Jones⁸ as described in their excellent paper. A general solution is obtained for an assumed one-dimensional propagation direction along the 1 axis of a standard rectangular coordinate system. Arbitrary crystalline orientations are handled by merely transforming all applicable material constants through specified Euler angles as indicated⁹ in Figure 1.

The following section begins by listing the general equations and describing the Euler transformation technique. Section 2.3 outlines the method of velocity determination, while Section 2.4 is concerned with calculations of mechanical and electrical field quantities.

(Due to the large number of references cited above, they will not be listed here. See References, page 527.)

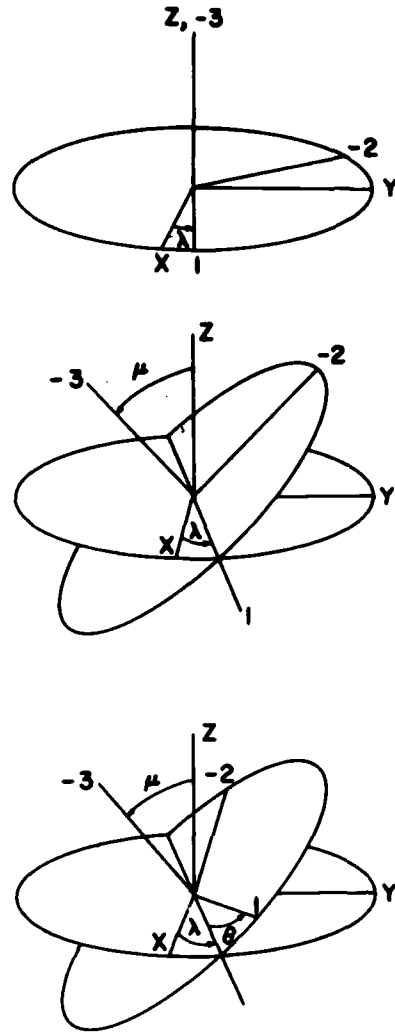


Figure 1. Coordinate System Used for Acoustic Bulk Wave Propagation. The phase velocity vector lies along the 1 axis. The crystalline axes are given in X, Y, and Z while the Euler angles are λ , μ and θ . (After H. Goldstein in Classical Mechanics)

2.2 General Equations

The set of linear equations describing acoustic wave propagation in an arbitrary, anisotropic piezoelectric medium is, in standard tensor notation, as follows⁷

$$\frac{\partial T_{ij}}{\partial x_i} = \rho \frac{\partial^2 u_i}{\partial t^2} \quad \text{equations of motion} \quad (1)$$

$$S_{kl} = \frac{1}{2} \left(\frac{\partial u_k}{\partial x_l} + \frac{\partial u_l}{\partial x_k} \right) \quad \text{linear, strain-mechanical displacement relations} \quad (2)$$

$$\left. \begin{aligned} \frac{\partial D_i}{\partial x_i} &= 0 \\ E_i &= - \frac{\partial \phi}{\partial x_i} \end{aligned} \right\} \quad \begin{array}{l} \text{derived from Maxwell's} \\ \text{equations under the} \\ \text{quasi-static assumption} \end{array} \quad (3)$$

$$\begin{aligned}
T_{ij} &= c'_{ijkl} S_{kl} - e'_{nij} E_n \\
D_m &= e'_{mkl} S_{kl} + \epsilon'_{mn} E_n
\end{aligned}
\quad \begin{array}{l} \text{linear piezoelectric constitutive} \\ \text{relations} \end{array}
\quad (4)$$

where T is the stress, ρ the mass density, u the mechanical displacement, S the strain, D the electric displacement, E the electric field, and ϕ the electric potential. The primed quantities refer to a rotated coordinate system in which the elastic constants (c'_{ijkl}), the piezoelectric constants (e'_{ijk}), and the dielectric constants (ϵ'_{ij}) are given in terms of the Euler transformation matrix V_{ij} and the unrotated quantities as follows:

$$c'_{ijkl} = V_{ir} V_{js} V_{kt} V_{ln} c_{rstn} \quad (5)$$

$$e'_{ijk} = V_{ir} V_{js} V_{kt} e_{rst} \quad (6)$$

$$\epsilon'_{ij} = V_{ir} V_{js} \epsilon_{rs} \quad (7)$$

Note that the summation convention (over 1, 2, 3) for repeated indices is employed. For completeness we also list the Euler transformation matrix in terms of the arbitrary Euler angles λ , μ and θ :

$$V = \begin{bmatrix} \cos \lambda \cos \theta - \sin \lambda \cos \mu \sin \theta & \sin \lambda \cos \theta + \cos \lambda \cos \mu \sin \theta & \sin \mu \sin \theta \\ -\cos \lambda \sin \theta - \sin \lambda \cos \mu \cos \theta & -\sin \lambda \sin \theta + \cos \lambda \cos \mu \cos \theta & \sin \mu \cos \theta \\ \sin \lambda \sin \mu & -\cos \lambda \sin \mu & \cos \mu \end{bmatrix}
\quad (8)$$

Note that for $\lambda = \mu = \theta = 0$, the coordinate system x_1 , x_2 and x_3 lies along the crystalline axes, X , Y and Z as illustrated in Figure 1.

By substitution, Eqs. (1) through (4) can be reduced to

$$c'_{ijkl} u_{k,li} + e'_{kij} \phi_{,ki} = \rho \ddot{u}_j \quad j = 1, 2, 3 \quad (9)$$

$$e'_{ikl} u_{k,li} - \epsilon'_{ik} \phi_{,ki} = 0 \quad (10)$$

The dot notation refers to differentiation with respect to time while an index preceded by a comma denotes differentiation with respect to a space coordinate.

2.3 Velocity Determination

Solutions of Eqs. (9) and (10) are assumed to be of the standard complex travelling-wave form in which v is the wave velocity and ω the steady-state angular frequency:

$$u_i = \beta_i e^{j\omega (t-x_1/v)} \quad i = 1, 2, 3 \quad (11)$$

$$\phi = \beta_4 e^{j\omega (t-x_1/v)} \quad (12)$$

Substituting these assumed solutions back into Eqs. (9) and (10) results in a 4×4 matrix times the vector matrix of the unknown β 's (the one-dimensional assumption implying $\partial/\partial x_2 = \partial/\partial x_3 = 0$ has been made):

$$\begin{bmatrix} (-c'_{11} + \rho v^2) & -c'_{16} & -c'_{15} & -e'_{11} \\ -c'_{16} & (-c'_{66} + \rho v^2) & -c'_{56} & -e'_{16} \\ -c'_{15} & -c'_{56} & (-c'_{55} + \rho v^2) & -e'_{15} \\ -e'_{11} & -e'_{16} & -e'_{15} & \epsilon'_{11} \end{bmatrix} \begin{bmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \\ \beta_4 \end{bmatrix} = 0 \quad (13)$$

Engineering notation¹⁰ has been introduced to simplify subscript convention.

For a non-trivial solution of the β 's to exist, the determinant of the 4×4 matrix must be zero:

10. Slobodnik, A.J., Jr. (1967) Microwave Rectification Using Quartz, TR-67-0143, AD 655776, National Technical Information Services, Springfield, Virginia 22151.

$$\begin{vmatrix}
 (-c'_{11} + \rho v^2) & -c'_{16} & -c'_{15} & -e'_{11} \\
 -c'_{16} & (-c'_{66} + \rho v^2) & -c'_{56} & -e'_{16} \\
 -c'_{15} & -c'_{56} & (-c'_{55} + \rho v^2) & -e'_{15} \\
 -e'_{11} & -e'_{16} & -e'_{15} & \epsilon'_{11}
 \end{vmatrix} = 0 \quad (14)$$

Evaluation of this relation results in a sixth-order polynomial in v of the form

$$v^6 + pv^4 + qv^2 + r = 0 \quad (15)$$

where

$$p = \frac{-(c'_{11} + c'_{55} + c'_{66})}{\rho} - \frac{(e'^2_{11} + e'^2_{15} + e'^2_{16})}{\rho \epsilon'_{11}} \quad (16)$$

$$\begin{aligned}
 q = & \frac{c'_{11}c'_{55} + c'_{11}c'_{66} - c'^2_{15} - c'^2_{16} + c'_{55}c'_{66} - c'^2_{56}}{\rho^2} \\
 & + \frac{(c'_{11} + c'_{55})e'^2_{16} + (c'_{11} + c'_{66})e'^2_{15} + (c'_{55} + c'_{66})e'^2_{11}}{\rho^2 \epsilon'_{11}} \\
 & - 2 \frac{c'_{56}e'_{15}e'_{16} + c'_{16}e'_{11}e'_{16} + c'_{15}e'_{11}e'_{15}}{\rho^2 \epsilon'_{11}} \quad (17)
 \end{aligned}$$

$$\begin{aligned}
r = & \frac{-c'_{11}c'_{55}c'_{66} + c'_{11}c'^2_{56} + c'^2_{16}c'_{55} - 2c'_{15}c'_{16}c'_{56} + c'^2_{15}c'_{66}}{\rho^3} \\
& + 2 \frac{c'_{11}c'_{56}e'_{15}e'_{16} - c'_{16}c'_{56}e'_{15}e'_{11} - c'_{15}c'_{16}e'_{15}e'_{16} + c'_{16}c'_{55}e'_{11}e'_{16}}{\rho^3 \epsilon'_{11}} \\
& + 2 \frac{c'_{15}c'_{66}e'_{11}e'_{15} - c'_{15}c'_{56}e'_{11}e'_{16}}{\rho^3 \epsilon'_{11}} \\
& + \frac{(c'^2_{13} - c'_{11}c'_{55})e'^2_{16} + (c'^2_{16} - c'_{11}c'_{66})e'^2_{15} + (c'^2_{56} - c'_{55}c'_{66})e'^2_{11}}{\rho^3 \epsilon'_{11}} \quad (18)
\end{aligned}$$

This sixth-order polynomial is then solved for the three (in general) positive and real velocities $v^{(j)}$ corresponding to the physical solutions. This is accomplished, of course, by means of a computer program.³ Several errors are present in the program listing of Reference 3; notably line 434 should have a minus rather than a plus sign and the phases for u_i and ϕ should be either 0 or 180 degrees.

2.4 Mechanical and Electrical Field Quantities

In order to calculate the mechanical displacements and electric potential associated with each of the three velocities determined in Section 2.3, it is necessary to return to Eq. (13). For each particular velocity, a set of β 's can be found ($\beta_i^{(j)}$, where $j = 1, 2, 3$) which satisfy Eq. (13). The mechanical displacements and electric potentials are then given by

$$u_i^{(j)} = \beta_i^{(j)} e^{j\omega(t-x_1/v^{(j)})} \quad (19)$$

$$\phi^{(j)} = \beta_4^{(j)} e^{j\omega(t-x_1/v^{(j)})} \quad (20)$$

These quantities normalized to the square root of the magnitude of the power in the propagation direction are printed out in Section 4. All other mechanical and electrical field quantities of interest are obtained by using Eqs. (19) and (20) in conjunction with Eqs. (1) through (4).

Strain is given directly in terms of mechanical displacement in Eq. (2). Thus:

$$S_{11}^{(j)} = \frac{1}{2} \left(\frac{\partial u_1^{(j)}}{\partial x_1} + \frac{\partial u_1^{(j)}}{\partial x_1} \right) = - \frac{\beta_1^{(j)} j\omega}{v^{(j)}} e^{j\omega(t-x_1/v^{(j)})} \quad (21)$$

$$S_{12}^{(j)} = S_{21}^{(j)} = \frac{1}{2} \frac{\partial u_2^{(j)}}{\partial x_1} = - \frac{\beta_2^{(j)} j\omega}{2v^{(j)}} e^{j\omega(t-x_1/v^{(j)})} \quad (22)$$

(Recall that we have made the one-dimensional assumption which implies $\partial/\partial x_2 = \partial/\partial x_3 = 0$)

$$S_{13}^{(j)} = S_{31}^{(j)} = \frac{1}{2} \frac{\partial u_3^{(j)}}{\partial x_1} = - \frac{\beta_3^{(j)} j\omega}{2v^{(j)}} e^{j\omega(t-x_1/v^{(j)})} \quad (23)$$

$$S_{22} = S_{33} = S_{32} = S_{23} = 0. \quad (24)$$

For convenience these quantities are normalized to the angular frequency:

$$\frac{S_{11}^{(j)}}{\omega} = - \frac{j\beta_1^{(j)}}{v^{(j)}} e^{j\omega(t-x_1/v^{(j)})} \quad (25)$$

$$\frac{S_{12}^{(j)}}{\omega} = \frac{S_{21}^{(j)}}{\omega} = - \frac{j\beta_2^{(j)}}{2v^{(j)}} e^{j\omega(t-x_1/v^{(j)})} \quad (26)$$

$$\frac{S_{13}^{(j)}}{\omega} = \frac{S_{31}^{(j)}}{\omega} = - \frac{j\beta_3^{(j)}}{2v^{(j)}} e^{j\omega(t-x_1/v^{(j)})} \quad (27)$$

These quantities normalized to $\sqrt{|P_1|}$ are the ones printed out in Section 4. Or in terms of engineering notation.

$$\frac{S_1^{(j)}}{\omega} = - \frac{j\beta_1^{(j)}}{v^{(j)}} e^{j\omega(t-x_1/v^{(j)})} \quad (28)$$

$$\frac{S_6^{(j)}}{\omega} = - \frac{j\beta_2^{(j)}}{v^{(j)}} e^{j\omega(t-x_1/v^{(j)})} \quad (29)$$

$$\frac{S_5^{(j)}}{\omega} = -\frac{j\beta_3^{(j)}}{v^{(j)}} e^{j\omega(t-x_1/v^{(j)})} \quad (30)$$

Using Eq. (3) yields the electric field (as printed out in Section 4 after normalization to $\sqrt{|P_1|}$).

$$\frac{E_1^{(j)}}{\omega} = \frac{j\beta_4^{(j)}}{v^{(j)}} e^{j\omega(t-x_1/v^{(j)})} \quad (31)$$

$$\frac{E_2^{(j)}}{\omega} = \frac{E_3^{(j)}}{\omega} = 0. \quad (32)$$

The stresses and electric displacements are obtained by using Eq. (4):

$$\frac{T_{11}^{(j)}}{\omega} = -\frac{j}{v^{(j)}} \left[c'_{11}\beta_1^{(j)} + c'_{15}\beta_3^{(j)} + c'_{16}\beta_2^{(j)} + e'_{11}\beta_4^{(j)} \right] e^{j\omega(t-x_1/v^{(j)})} \quad (33)$$

$$\frac{T_{22}^{(j)}}{\omega} = -\frac{j}{v^{(j)}} \left[c'_{21}\beta_1^{(j)} + c'_{25}\beta_3^{(j)} + c'_{26}\beta_2^{(j)} + e'_{12}\beta_4^{(j)} \right] e^{j\omega(t-x_1/v^{(j)})} \quad (34)$$

$$\frac{T_{33}^{(j)}}{\omega} = -\frac{j}{v^{(j)}} \left[c'_{31}\beta_1^{(j)} + c'_{35}\beta_3^{(j)} + c'_{36}\beta_2^{(j)} + e'_{13}\beta_4^{(j)} \right] e^{j\omega(t-x_1/v^{(j)})} \quad (35)$$

$$\frac{T_{23}^{(j)}}{\omega} = \frac{T_{32}^{(j)}}{\omega} = -\frac{j}{v^{(j)}} \left[c'_{41}\beta_1^{(j)} + c'_{45}\beta_3^{(j)} + c'_{46}\beta_2^{(j)} + e'_{14}\beta_4^{(j)} \right] e^{j\omega(t-x_1/v^{(j)})} \quad (36)$$

$$\frac{T_{31}^{(j)}}{\omega} = \frac{T_{13}^{(j)}}{\omega} = -\frac{j}{v^{(j)}} \left[c'_{51}\beta_1^{(j)} + c'_{55}\beta_3^{(j)} + c'_{56}\beta_2^{(j)} + e'_{15}\beta_4^{(j)} \right] e^{j\omega(t-x_1/v^{(j)})} \quad (37)$$

$$\frac{T_{21}^{(j)}}{\omega} = \frac{T_{12}^{(j)}}{\omega} = -\frac{j}{v^{(j)}} \left[c'_{61}\beta_1^{(j)} + c'_{65}\beta_3^{(j)} + c'_{66}\beta_2^{(j)} + e'_{16}\beta_4^{(j)} \right] e^{j\omega(t-x_1/v^{(j)})} \quad (38)$$

$$\frac{D_1^{(j)}}{\omega} = -\frac{j}{v^{(j)}} \left[e'_{11}\beta_1^{(j)} + e'_{15}\beta_3^{(j)} + e'_{16}\beta_2^{(j)} - e'_{11}\beta_4^{(j)} \right] e^{j\omega(t-x_1/v^{(j)})} \quad (39)$$

$$\frac{D_2^{(j)}}{\omega} = -\frac{j}{v^{(j)}} \left[e'_{21}\beta_1^{(j)} + e'_{25}\beta_3^{(j)} + e'_{26}\beta_2^{(j)} - e'_{21}\beta_4^{(j)} \right] e^{j\omega(t-x_1/v^{(j)})} \quad (40)$$

$$\frac{D_3^{(j)}}{\omega} = -\frac{j}{v^{(j)}} \left[e'_{31}\beta_1^{(j)} + e'_{35}\beta_3^{(j)} + e'_{36}\beta_2^{(j)} - e'_{31}\beta_4^{(j)} \right] e^{j\omega(t-x_1/v^{(j)})} \quad (41)$$

These are the quantities printed out in Section 4 after normalization to $\sqrt{|P_1|}$.

Another important quantity of interest is the total electromechanical complex power density which is defined by:

$$P_i = -\frac{1}{2} T_{ij} \dot{u}_j^* + \frac{1}{2} \phi \dot{D}_i^* \quad (42)$$

where the first term represents the flow of complex mechanical power at any point, and the second term represents the electric power flow. In expanded form, Eq.

(42) becomes:

$$P_1 = -\frac{1}{2} \left[T_{11} \dot{u}_1^* + T_{12} \dot{u}_2^* + T_{13} \dot{u}_3^* - \phi \dot{D}_1^* \right] \quad (43)$$

$$P_2 = -\frac{1}{2} \left[T_{21} \dot{u}_1^* + T_{22} \dot{u}_2^* + T_{23} \dot{u}_3^* - \phi \dot{D}_2^* \right] \quad (44)$$

$$P_3 = -\frac{1}{2} \left[T_{31} \dot{u}_1^* + T_{32} \dot{u}_2^* + T_{33} \dot{u}_3^* - \phi \dot{D}_3^* \right] \quad (45)$$

Substituting Eqs. (19), (20), and (33) through (41) into Eqs. (43) through (45) yields explicit expressions for the complex power flow in the form printed out in Section 4.

$$\begin{aligned} \frac{P_1^{(j)}}{\omega^2} = & \frac{1}{2v^{(j)}} \left[c'_{11}\beta_1^{(j)*} + c'_{15}\beta_3^{(j)}\beta_1^{(j)*} + c'_{16}\beta_2^{(j)}\beta_1^{(j)*} + e'_{11}\beta_4^{(j)}\beta_1^{(j)*} \right. \\ & + c'_{61}\beta_1^{(j)}\beta_2^{(j)*} + c'_{65}\beta_3^{(j)}\beta_2^{(j)*} + c'_{66}\beta_2^{(j)}\beta_2^{(j)*} + e'_{16}\beta_4^{(j)}\beta_2^{(j)*} + c'_{51}\beta_1^{(j)}\beta_3^{(j)*} \\ & + c'_{55}\beta_3^{(j)}\beta_3^{(j)*} + c'_{56}\beta_2^{(j)}\beta_3^{(j)*} + e'_{15}\beta_4^{(j)}\beta_3^{(j)*} \left. \right] \\ & + \frac{1}{2v^{(j)}} \left[e'_{11}\beta_4^{(j)}\beta_1^{(j)*} + e'_{15}\beta_4^{(j)}\beta_3^{(j)*} + e'_{16}\beta_4^{(j)}\beta_2^{(j)*} - e'_{11}\beta_4^{(j)}\beta_4^{(j)*} \right] \quad (46) \end{aligned}$$

$$\begin{aligned}
\frac{P_2^{(j)}}{\omega^2} = & \frac{1}{2v^{(j)}} \left[c'_{61}\beta_1^{(j)}\beta_1^{(j)*} + c'_{65}\beta_3^{(j)}\beta_1^{(j)*} + c'_{66}\beta_2^{(j)}\beta_1^{(j)*} + e'_{16}\beta_4^{(j)}\beta_1^{(j)*} \right. \\
& + c'_{21}\beta_1^{(j)}\beta_2^{(j)*} + c'_{25}\beta_3^{(j)}\beta_2^{(j)*} + c'_{26}\beta_2^{(j)}\beta_2^{(j)*} + e'_{12}\beta_4^{(j)}\beta_2^{(j)*} + c'_{41}\beta_1^{(j)}\beta_3^{(j)*} \\
& \left. + c'_{45}\beta_3^{(j)}\beta_3^{(j)*} + c'_{46}\beta_2^{(j)}\beta_3^{(j)*} + e'_{14}\beta_4^{(j)}\beta_3^{(j)*} \right] \\
& + \frac{1}{2v^{(j)}} \left[e'_{21}\beta_4^{(j)}\beta_1^{(j)*} + e'_{25}\beta_4^{(j)}\beta_3^{(j)*} + e'_{26}\beta_4^{(j)}\beta_2^{(j)*} - e'_{21}\beta_4^{(j)}\beta_4^{(j)*} \right] \quad (47)
\end{aligned}$$

$$\begin{aligned}
\frac{P_3^{(j)}}{\omega^2} = & \frac{1}{2v^{(j)}} \left[c'_{51}\beta_1^{(j)}\beta_1^{(j)*} + c'_{55}\beta_3^{(j)}\beta_1^{(j)*} + c'_{56}\beta_2^{(j)}\beta_1^{(j)*} + e'_{15}\beta_4^{(j)}\beta_1^{(j)*} \right. \\
& + c'_{41}\beta_1^{(j)}\beta_2^{(j)*} + c'_{45}\beta_3^{(j)}\beta_2^{(j)*} + c'_{46}\beta_2^{(j)}\beta_2^{(j)*} + e'_{14}\beta_4^{(j)}\beta_2^{(j)*} + c'_{31}\beta_1^{(j)}\beta_3^{(j)*} \\
& \left. + c'_{33}\beta_3^{(j)}\beta_3^{(j)*} + c'_{36}\beta_2^{(j)}\beta_3^{(j)*} + e'_{13}\beta_4^{(j)}\beta_3^{(j)*} \right] \\
& + \frac{1}{2v^{(j)}} \left[e'_{31}\beta_4^{(j)}\beta_1^{(j)*} + e'_{35}\beta_4^{(j)}\beta_3^{(j)*} + e'_{36}\beta_4^{(j)}\beta_2^{(j)*} - e'_{31}\beta_4^{(j)}\beta_4^{(j)*} \right] \quad (48)
\end{aligned}$$

A pure mode axis will be defined as any direction for which $P_2 = P_3 = 0$. In order to quantitatively describe the deviations from a pure mode axis, it is convenient to define quantities known as the power flow angles:

$$\phi_{12}^{(j)} \equiv \tan^{-1} \frac{\text{Re}[P_2^{(j)}/\omega^2]}{\text{Re}[P_1^{(j)}/\omega^2]} \quad (49)$$

$$\phi_{13}^{(j)} \equiv \tan^{-1} \frac{\text{Re}[P_3^{(j)}/\omega^2]}{\text{Re}[P_1^{(j)}/\omega^2]} \quad (50)$$

where, of course, the time average power flow in a given direction is the real part of the complex power.^{11, 12} These quantities are printed out in Section 4.

3. BULK WAVE VELOCITY AND POWER FLOW ANGLE CURVES

Three types of data are presented in this section: Bulk wave phase velocities; power flow angles determined according to Eqs. (49) and (50); and for all piezoelectric materials, the quantity $\delta v/v$. This last parameter is the percentage change in velocity due to piezoelectric stiffening and is a direct measure of sound wave coupling to a perpendicular electric field. It is calculated by computing the velocity in the normal way, subtracting the velocity for the same mode (not always easy to identify) computed with piezoelectric constants set to zero, and finally dividing by the actual velocity.

No plots for the indicated modes are provided for the 0, 0 theta orientations of the materials listed in Table 1, since the normally plotted parameters are constant as a function of angle. Numerical data can be found in Section 4 which is therefore applicable to the entire plane.

Table 1. List of Materials and Modes Which Have Constant Properties for the Entire 0, 0 Theta Orientation

Material	Mode	Velocity (m/sec)
Diamond	First Shear	12,804.4
Eu ₃ FeO ₁₂	First Shear	3483.4
Gadolinium	First Shear	3567.8
Gallium Garnet	First Shear	3548.8
Germanium	First Shear	3548.8
Lead Molybdate	Second Shear	1960.0
PbS	Second Shear	1751.2
MgO	First Shear	6598.4
Rutile	Second Shear	5382.6
Silicon	Second Shear	5844.9
Spinel	First Shear	6536.5
TeO ₂	Second Shear	2103.3
YAG	First Shear	5027.4
Yttrium Gallium Garnet	First Shear	4061.3
YIG	Second Shear	3844.2
ZnO	All Modes	—

11. Auld, B. A. (1973) Acoustic Fields and Waves in Solids, Wiley, New York.
12. Coquin, G. A., and Tiersten, H. F. (1967) Analysis of the excitation and detection of piezoelectric surfaces in quartz by means of surface electrodes, J. Acoust. Soc. Am. 41:921-939.

Each of the three quantities described above are presented for various crystal-line orientations as continuous graphical functions of the direction of propagation in the planes of various plates as defined in Figure 2. Information necessary to understand the "rotated constant" notations can be found in the Appendix. Separate sets of curves are provided for the longitudinal, first shear and second shear waves. In all cases, except TeO_2 , the longitudinal wave is considered to have the highest velocity and no differentiation is made between these and quasi-longitudinal or quasi-shear waves. To preserve continuous graphical functions in the presence of fast and slow shear mode velocity crossover, the first and second shear waves as listed in this handbook do not necessarily coincide with the fast and slow shear modes. Some shear wave labeling inconsistencies may also be found between the graphs and numerical data. For TeO_2 longitudinal, fast shear crossover exists and this material must be considered a special case.

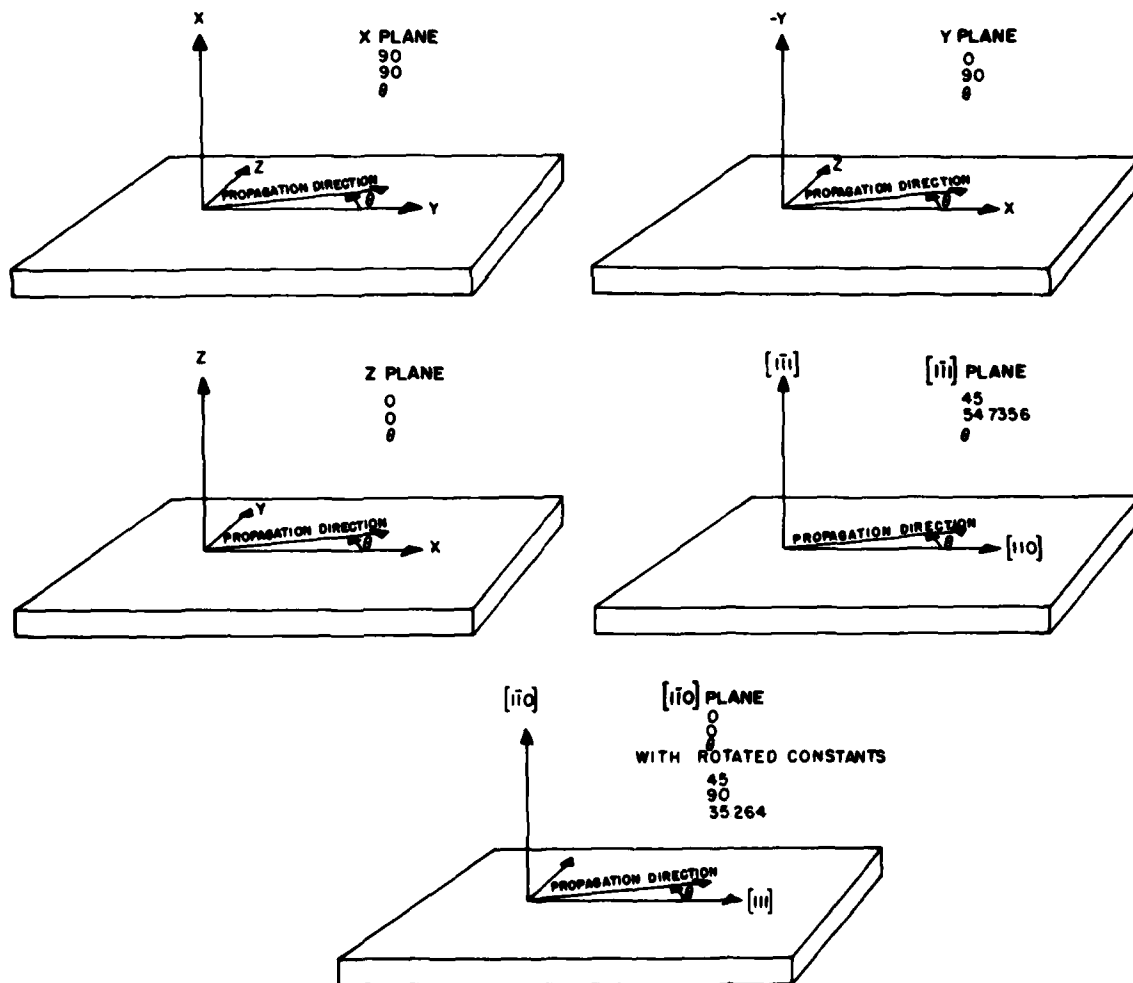
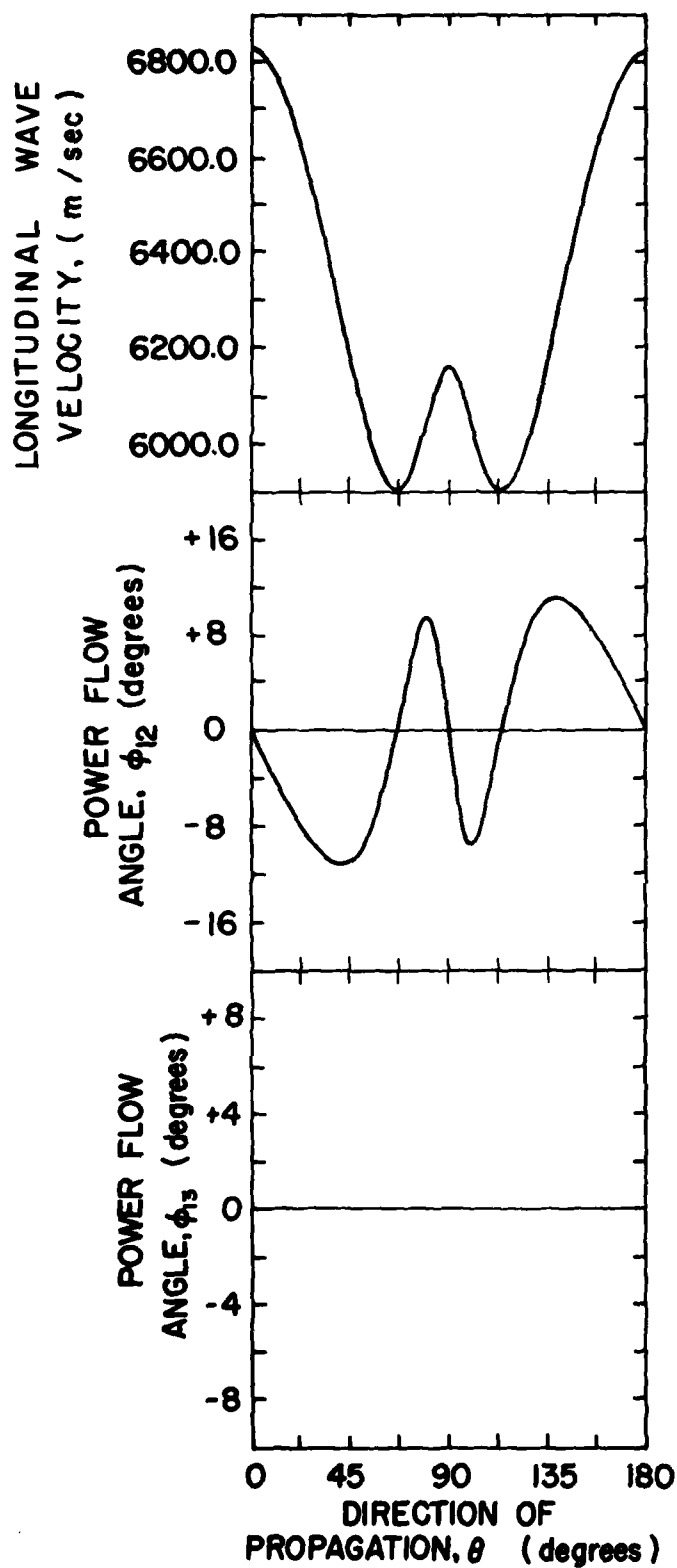
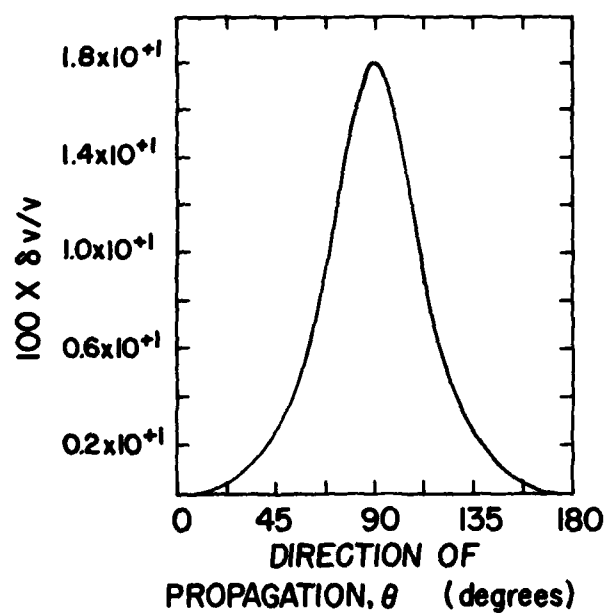


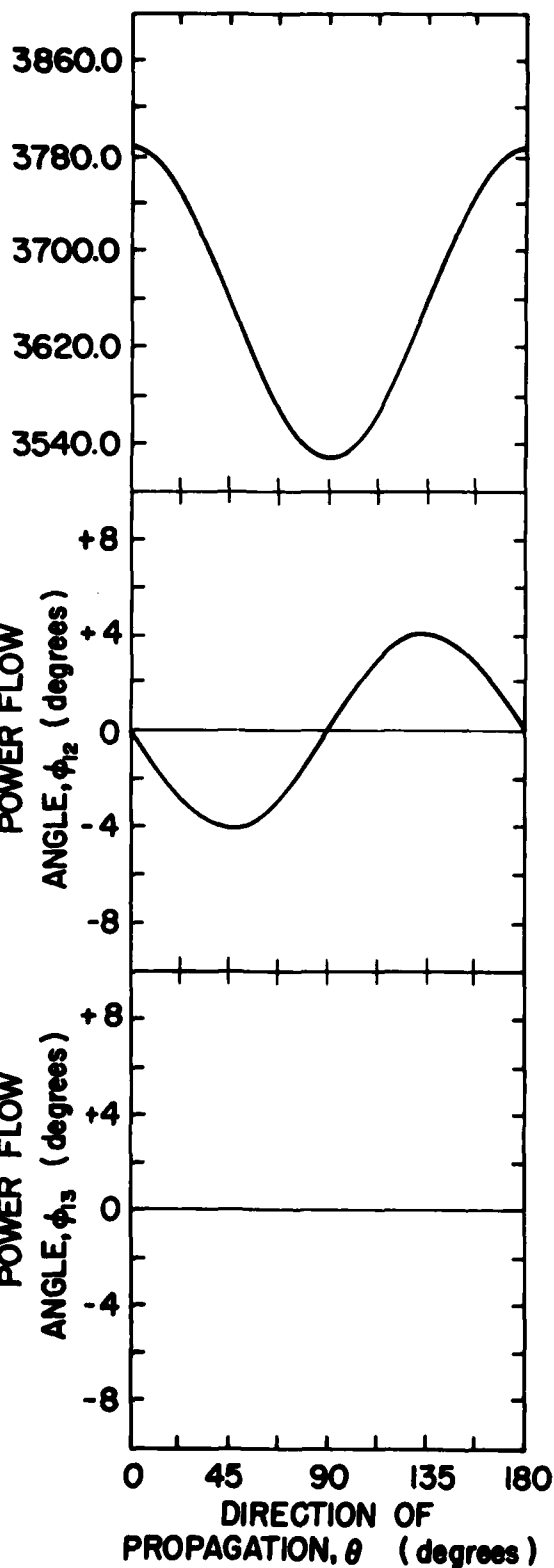
Figure 2. Euler Angle Notation For Acoustic Bulk Wave Propagation. The X plane can also be called the YZ plane, the Y plane can be referred to as the XZ plane, and the Z plane is also known as the XY plane



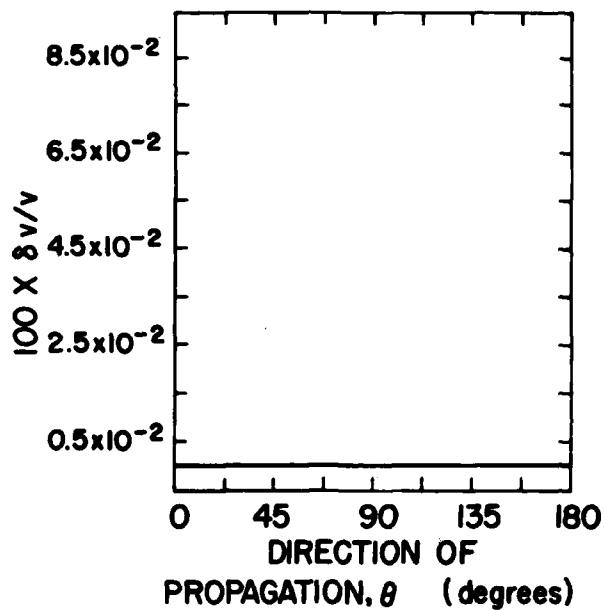
X - PLANE
 $\text{Ba}_2\text{NaNb}_5\text{O}_{15}$



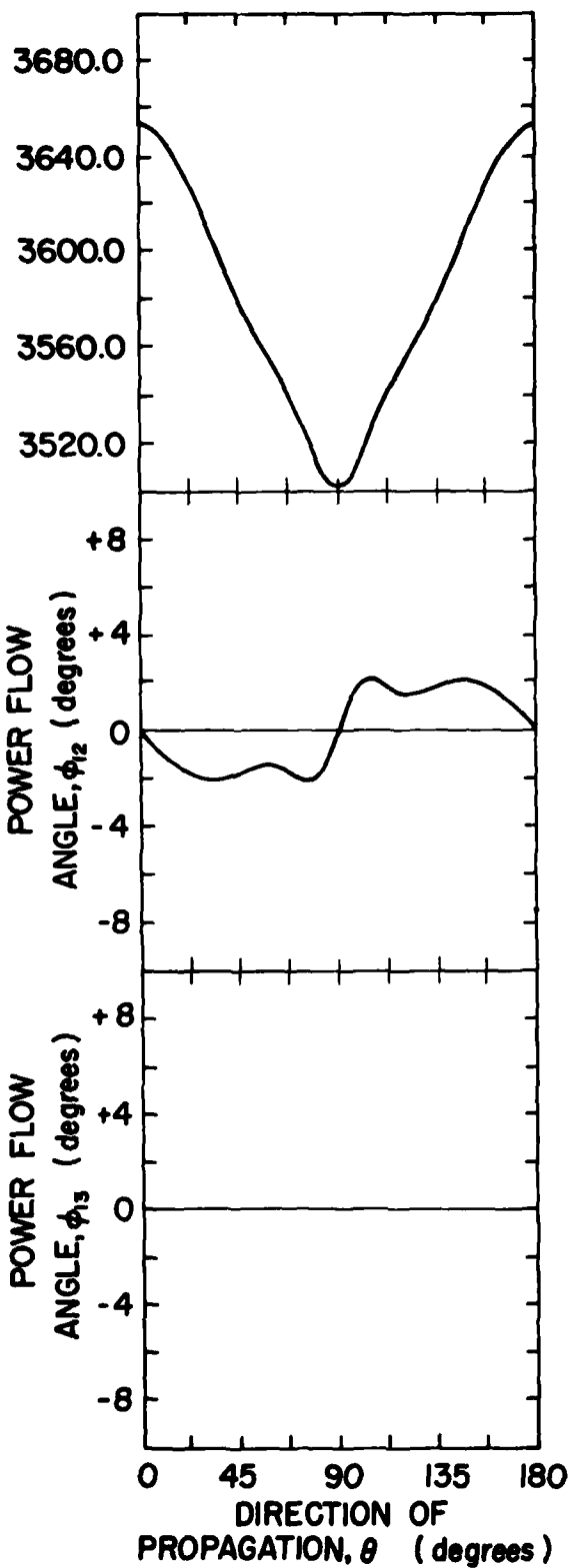
FIRST SHEAR WAVE
VELOCITY, (m/sec)



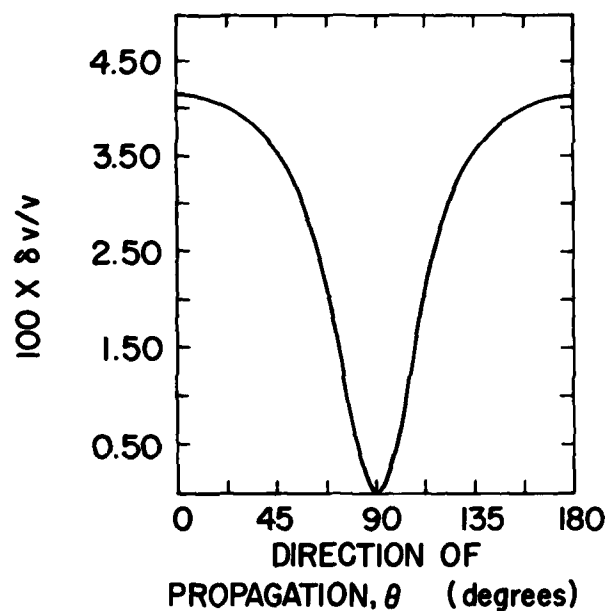
X-PLANE
 $\text{Ba}_2\text{NaNb}_5\text{O}_{15}$

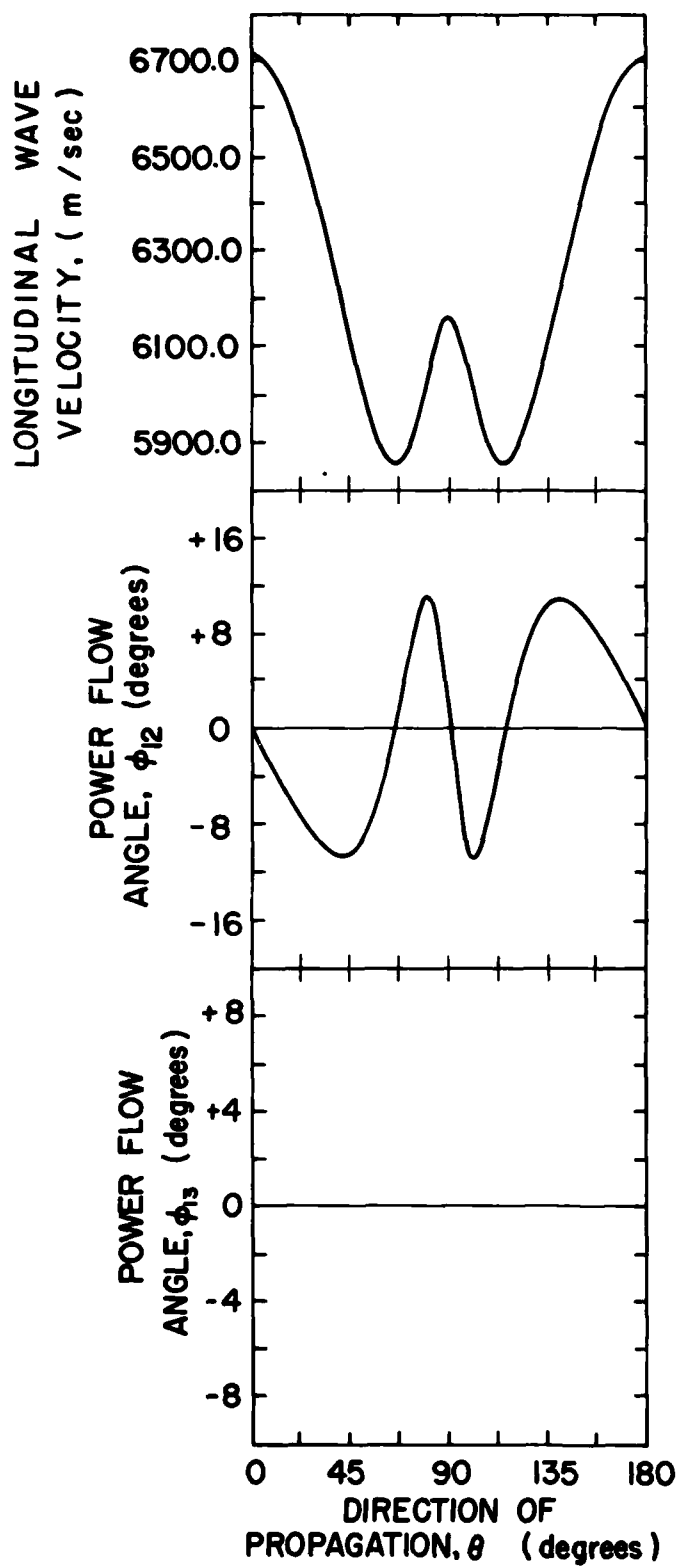


SECOND SHEAR WAVE
VELOCITY, (m/sec)

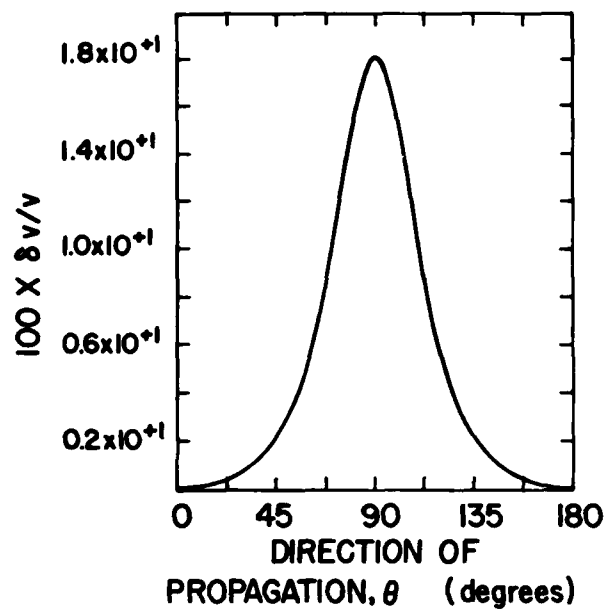


X-PLANE
 $\text{Ba}_2\text{NaNb}_5\text{O}_{15}$

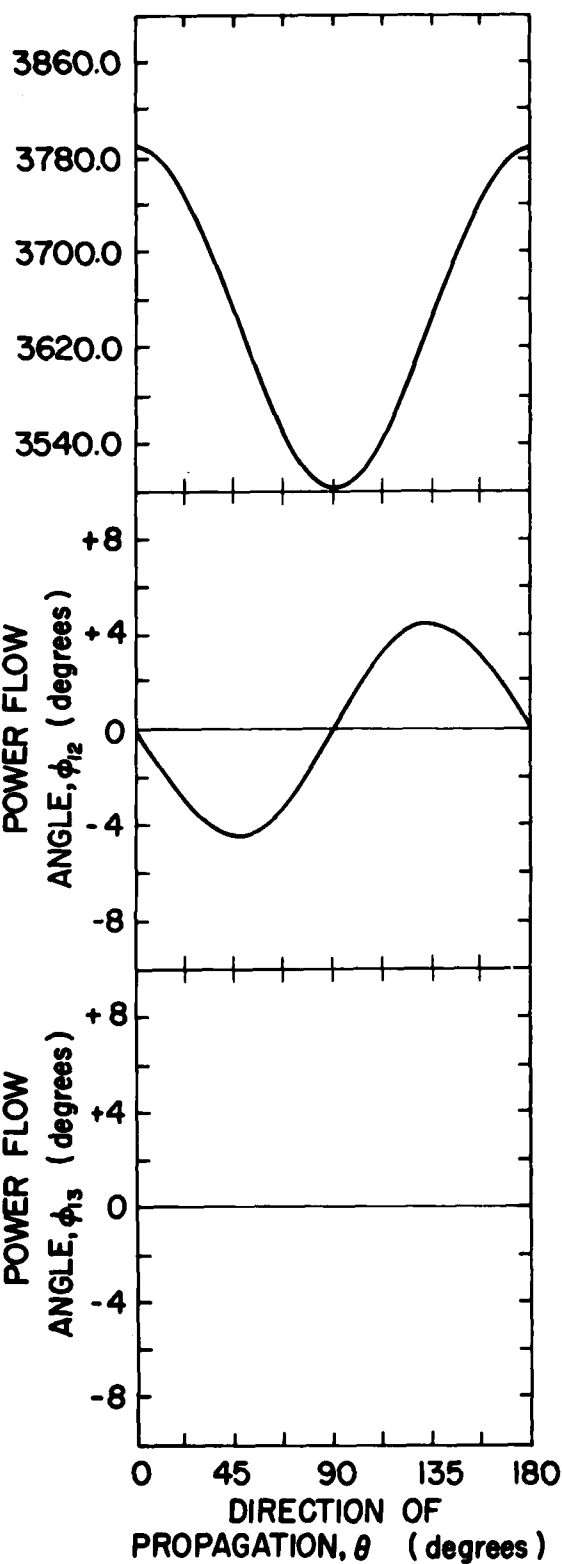




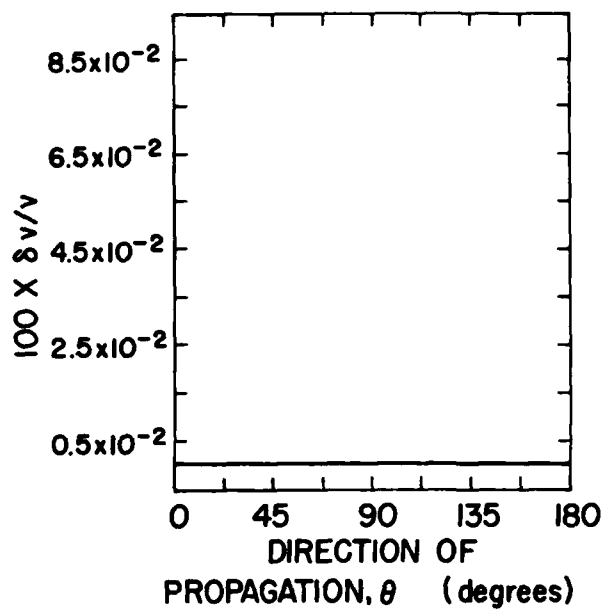
Y-PLANE
 $\text{Ba}_2\text{NaNb}_5\text{O}_{15}$



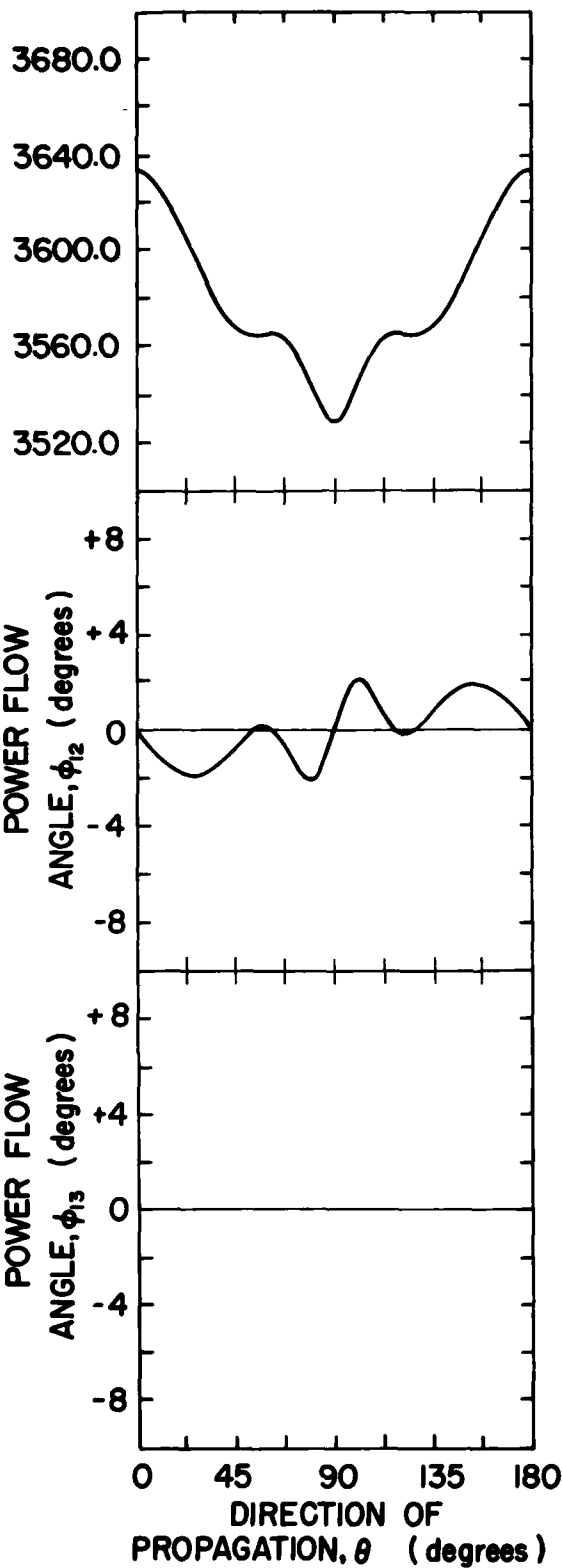
FIRST SHEAR WAVE
VELOCITY, (m/sec)



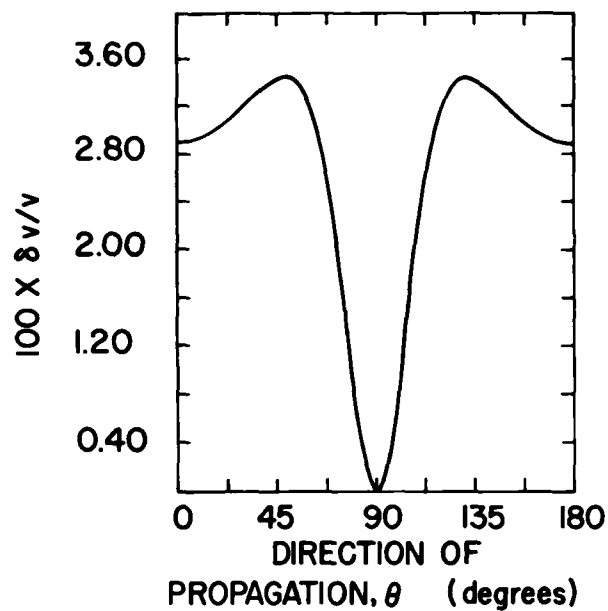
Y-PLANE
 $\text{Ba}_2\text{NaNb}_5\text{O}_{15}$



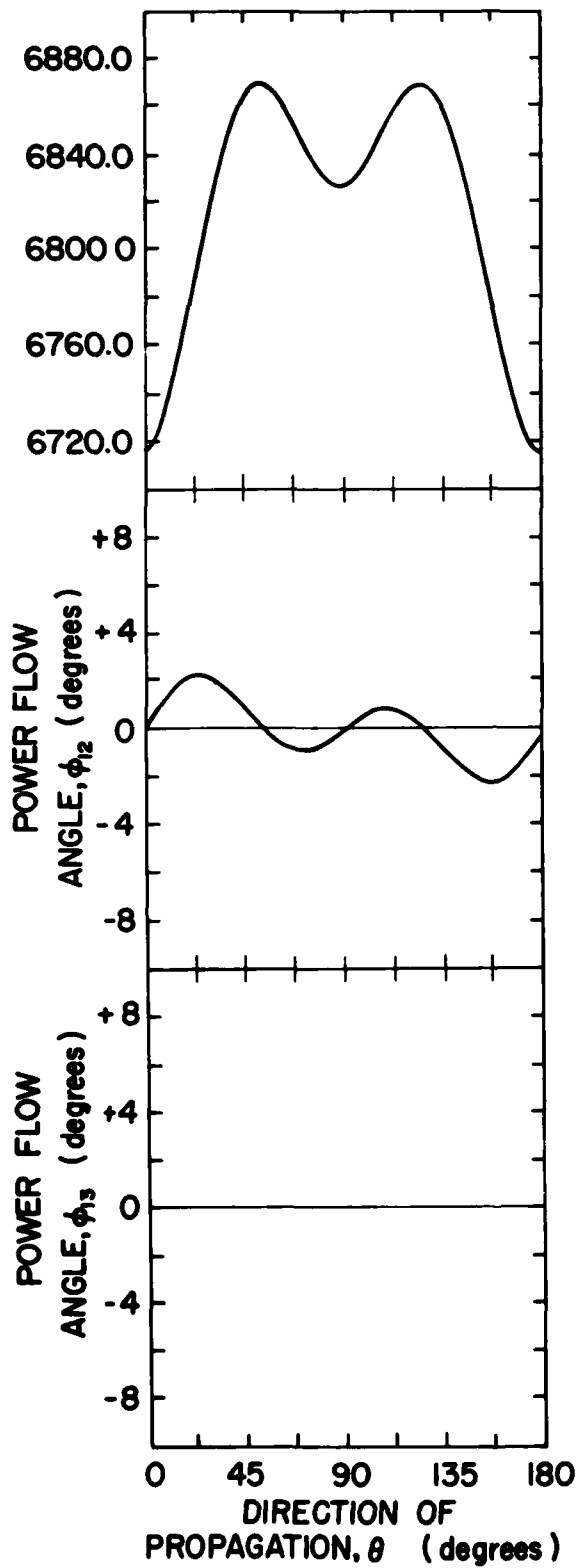
SECOND SHEAR WAVE
VELOCITY, (m/sec)



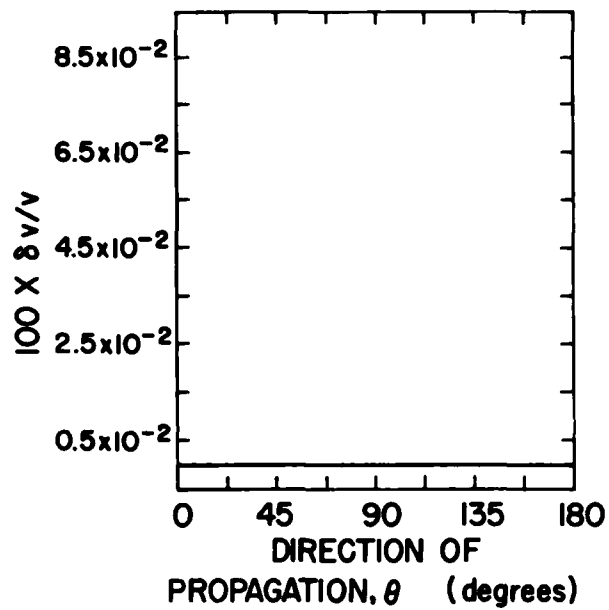
Y-PLANE
 $\text{Ba}_2\text{NaNb}_5\text{O}_{15}$



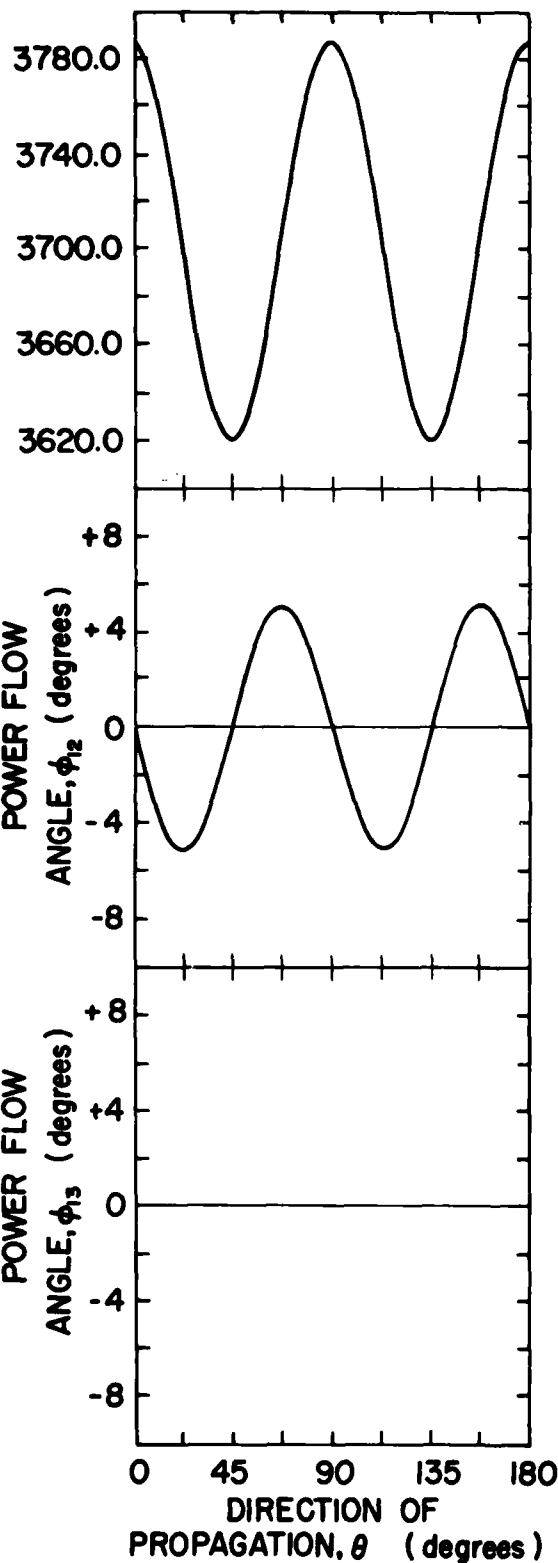
LONGITUDINAL WAVE
VELOCITY, (m / sec)



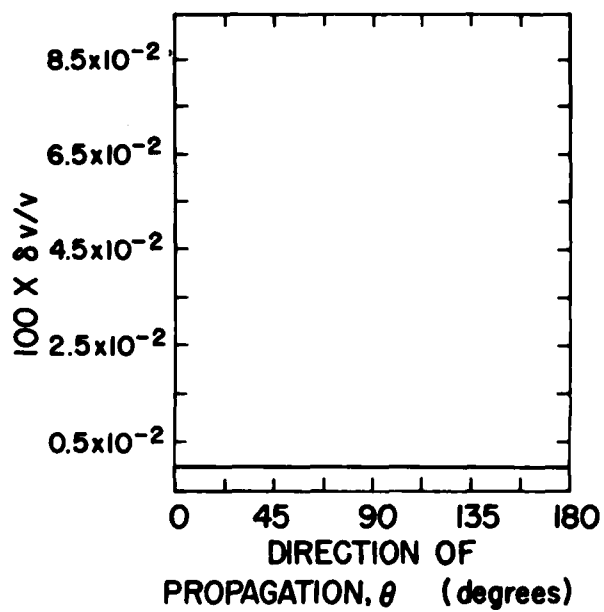
Z - PLANE
 $\text{Ba}_2\text{NaNb}_5\text{O}_{15}$

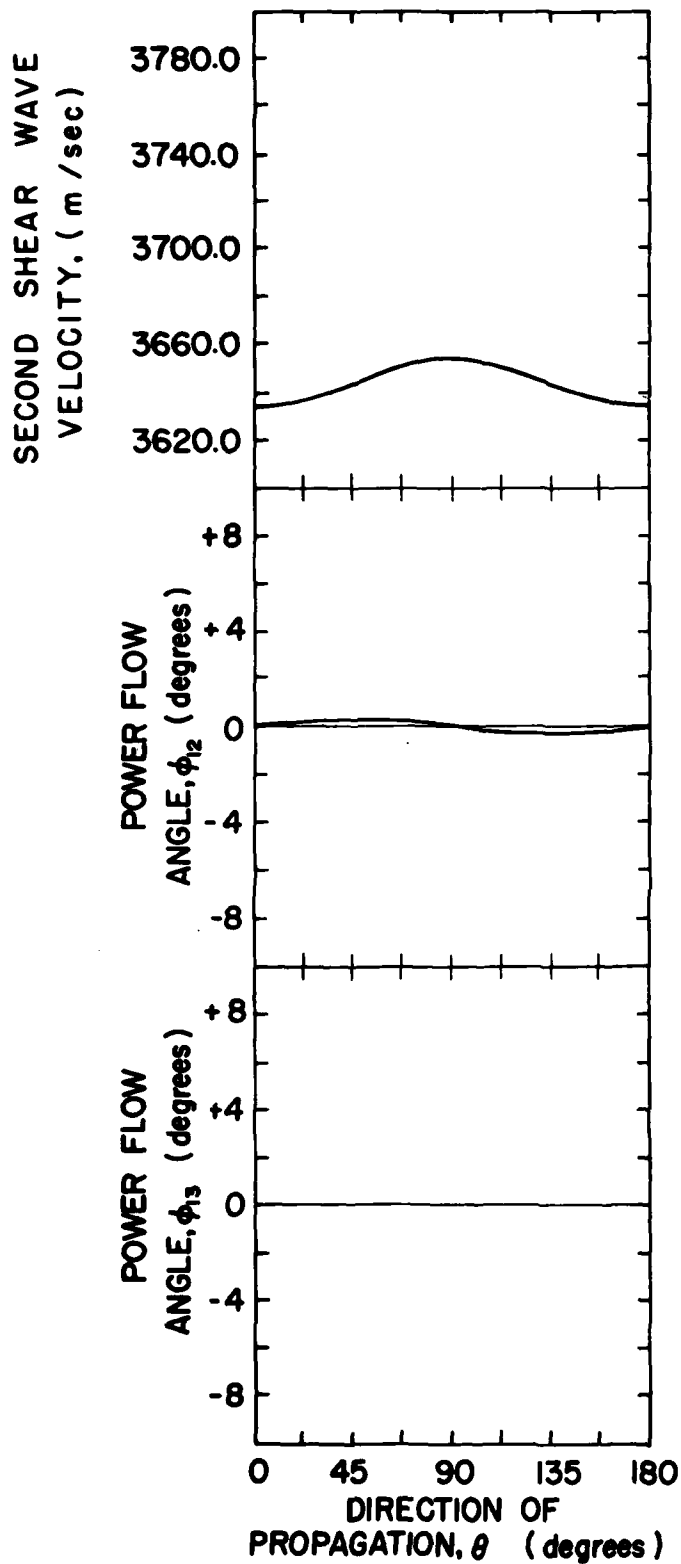


FIRST SHEAR WAVE
VELOCITY, (m/sec)

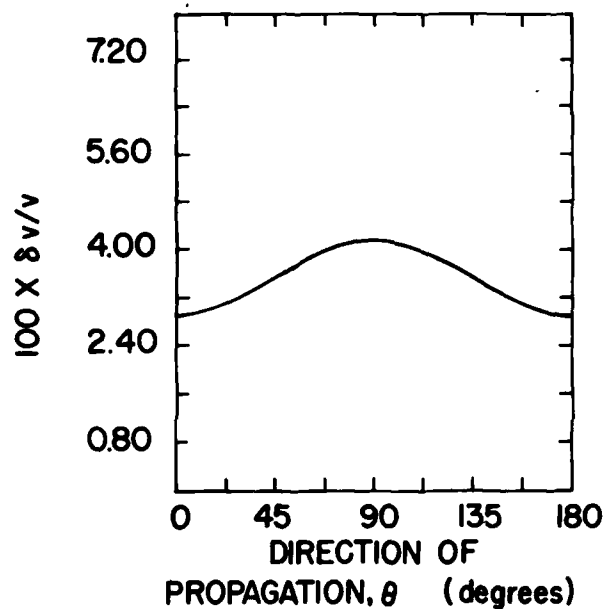


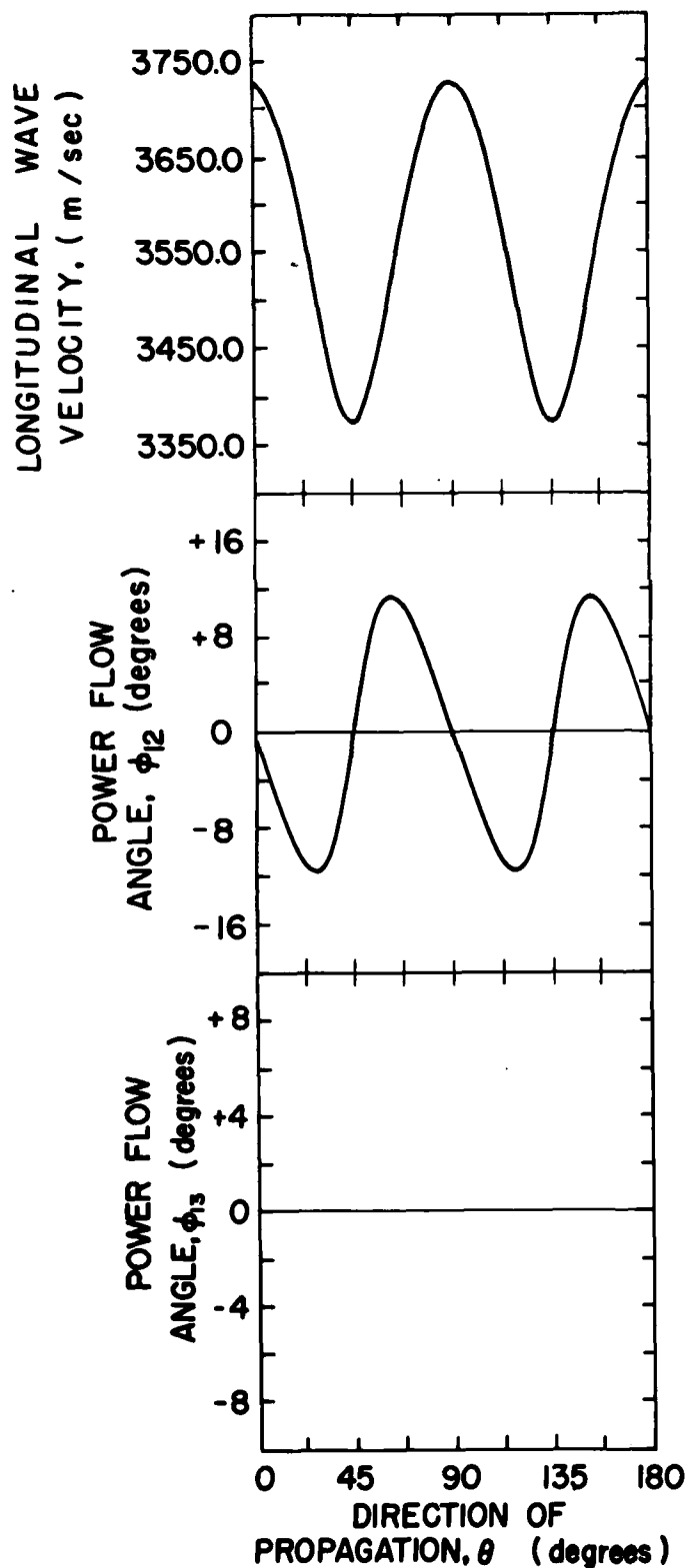
Z-PLANE
 $\text{Ba}_2\text{NaNb}_5\text{O}_{15}$



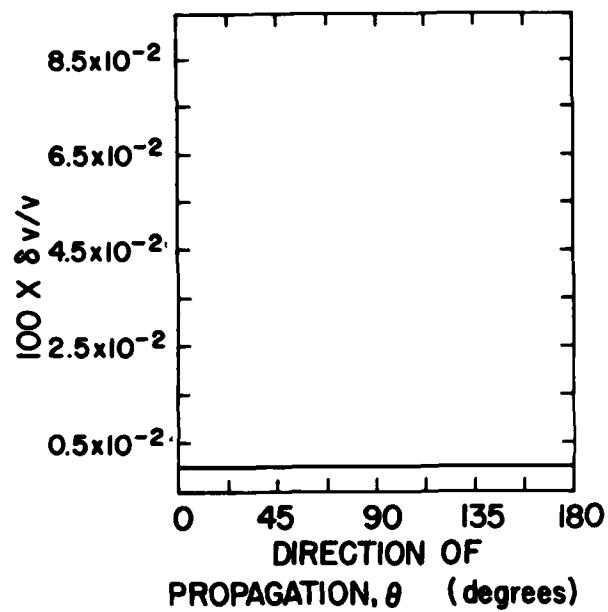


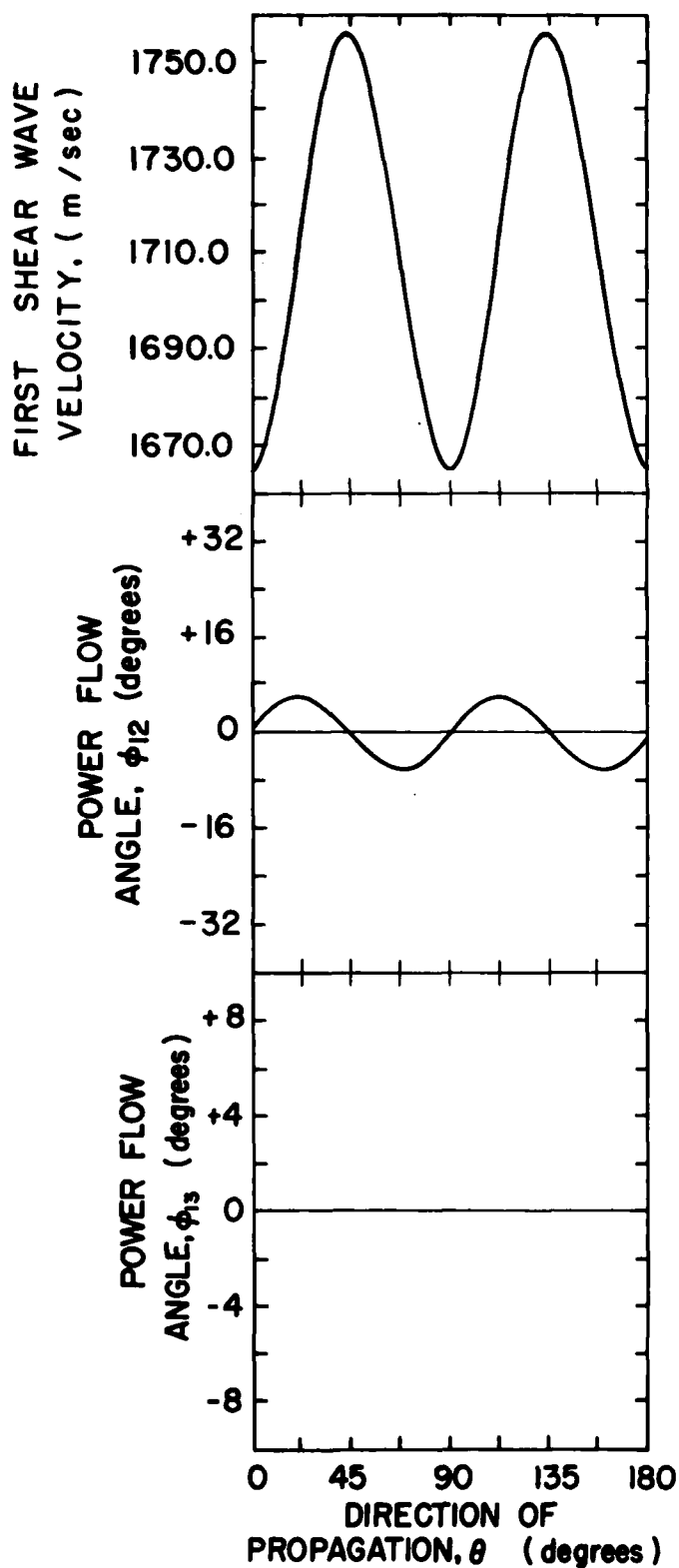
Z - PLANE
 $\text{Ba}_2\text{NaNb}_5\text{O}_{15}$



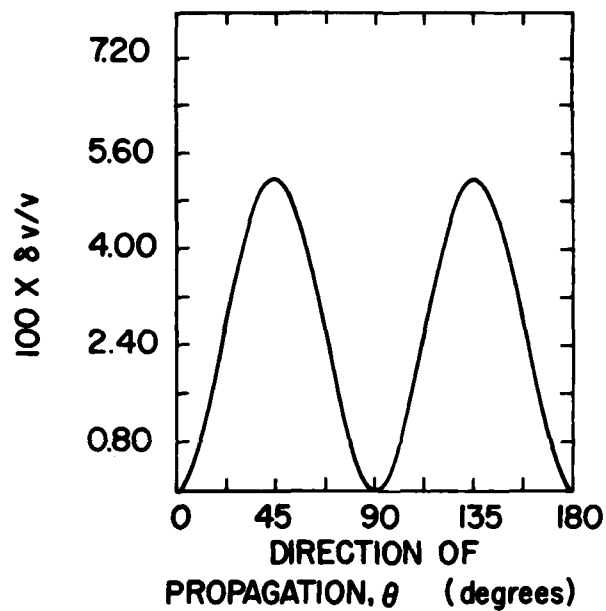


Z-PLANE
 $\text{Bi}_{12}\text{GeO}_{20}$
(Slobodnik and Sethares)

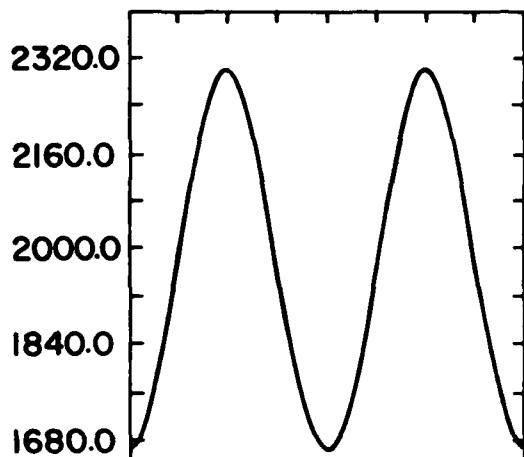




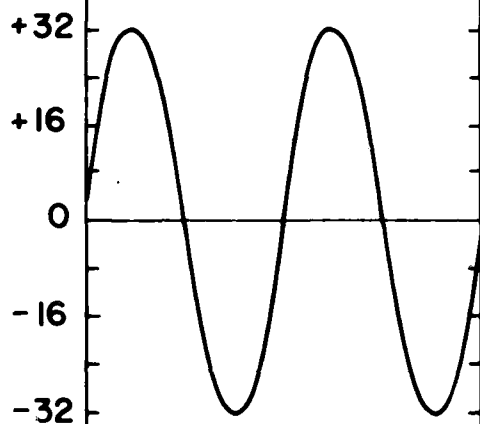
**Z - PLANE
 $\text{Bi}_{12}\text{GeO}_{20}$
(Slobodnik and Sethares)**



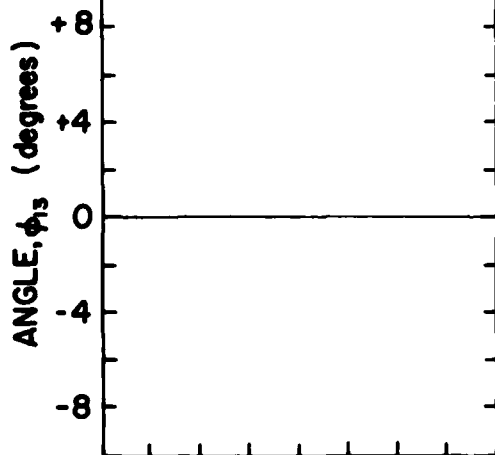
SECOND SHEAR WAVE
VELOCITY, (m/sec)



POWER FLOW
ANGLE, ϕ_{12} (degrees)

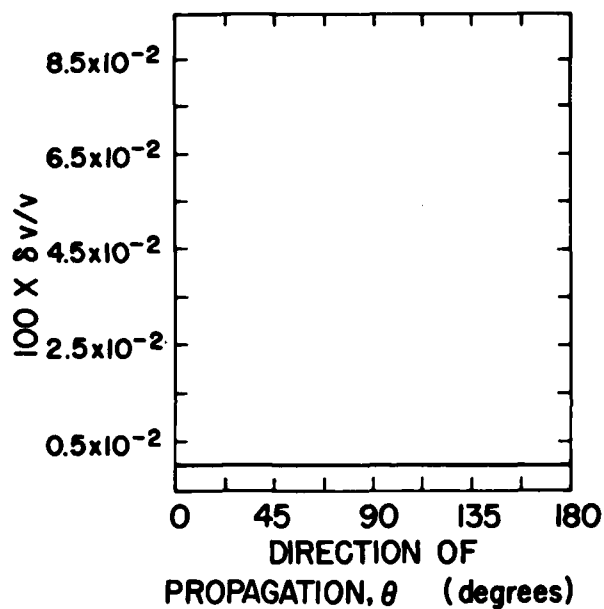


POWER FLOW
ANGLE, ϕ_{13} (degrees)



DIRECTION OF
PROPAGATION, θ (degrees)

Z-PLANE
 $\text{Bi}_{12}\text{GeO}_{20}$
(Slobodnik and Sethares)



LONGITUDINAL WAVE
VELOCITY, (m / sec)

3442.0
3426.0
3410.0
3394.0
3378.0

POWER FLOW
ANGLE, ϕ_{12} (degrees)

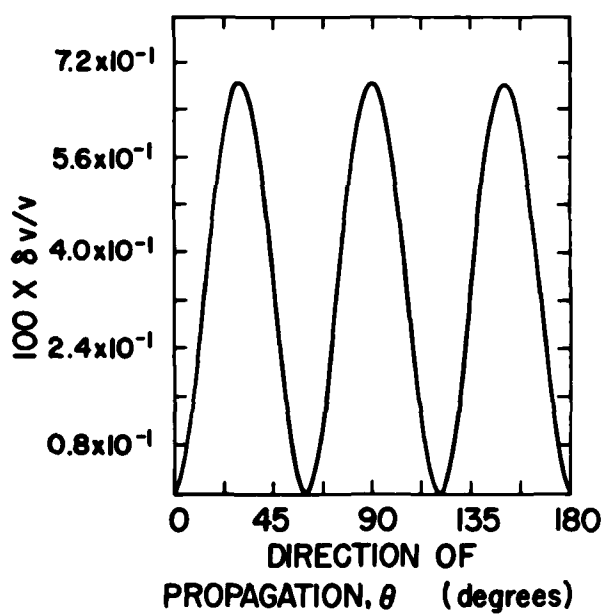
+8
+4
0
-4
-8

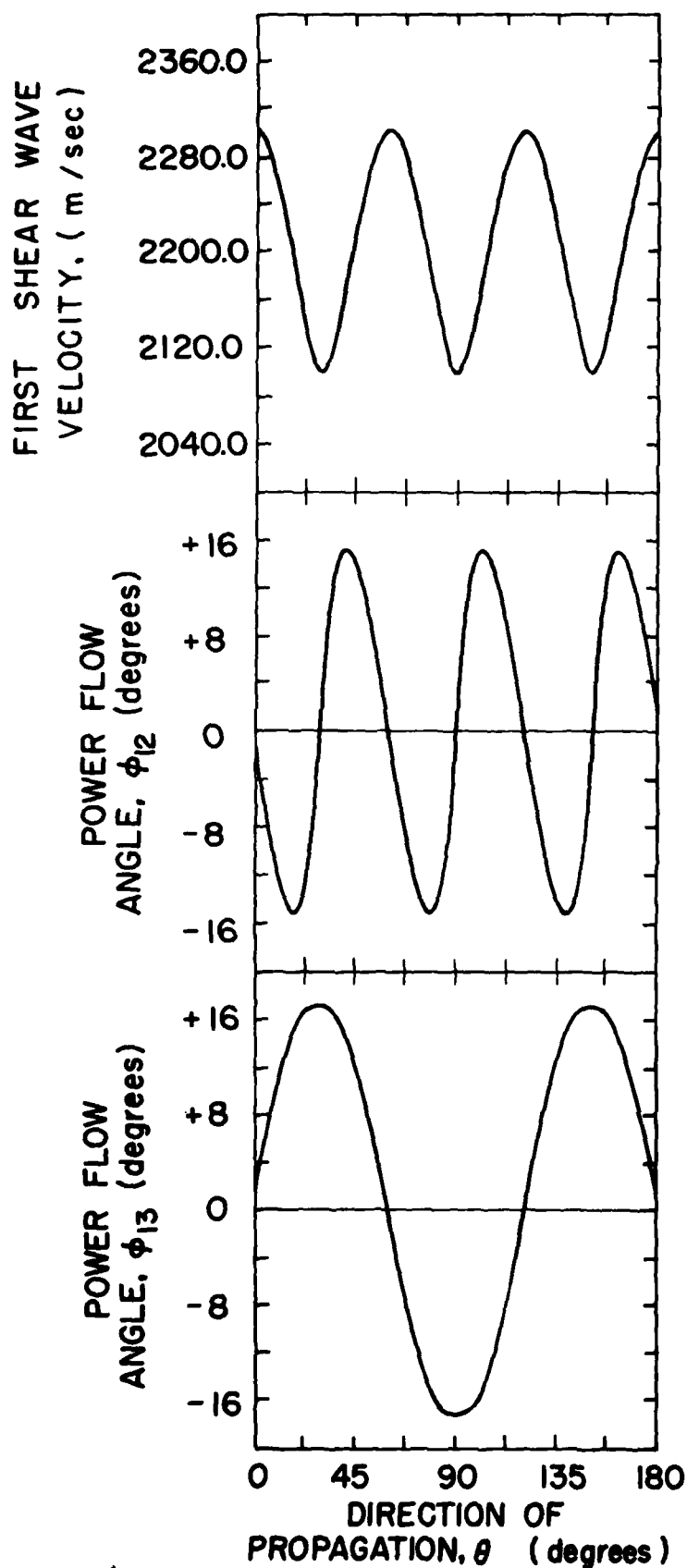
POWER FLOW
ANGLE, ϕ_{13} (degrees)

+16
+8
0
-8
-16

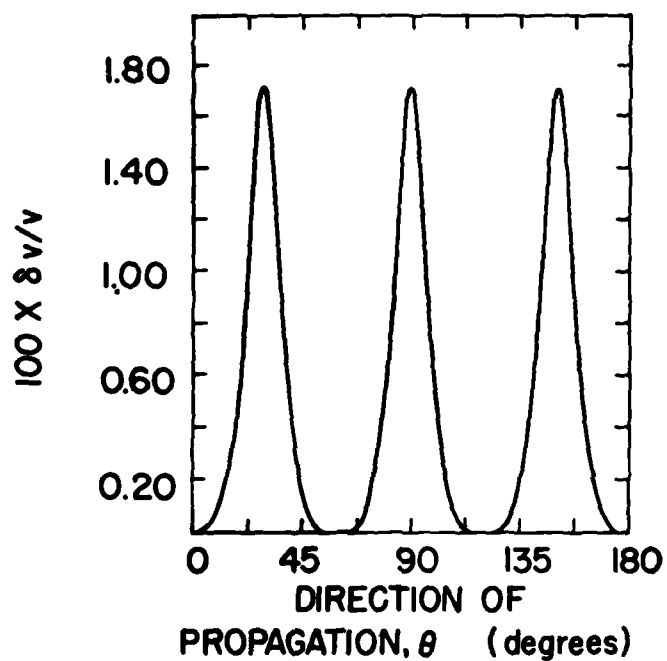
0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

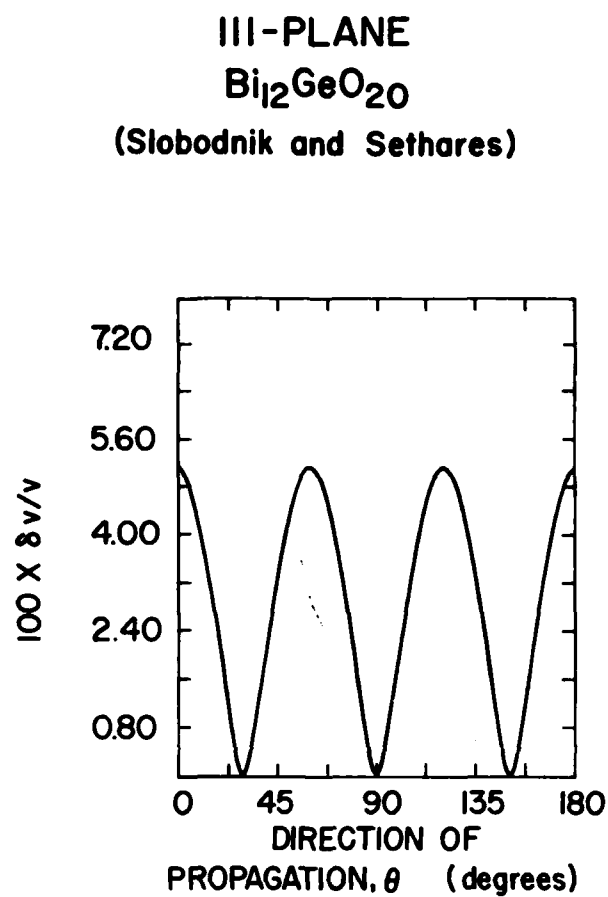
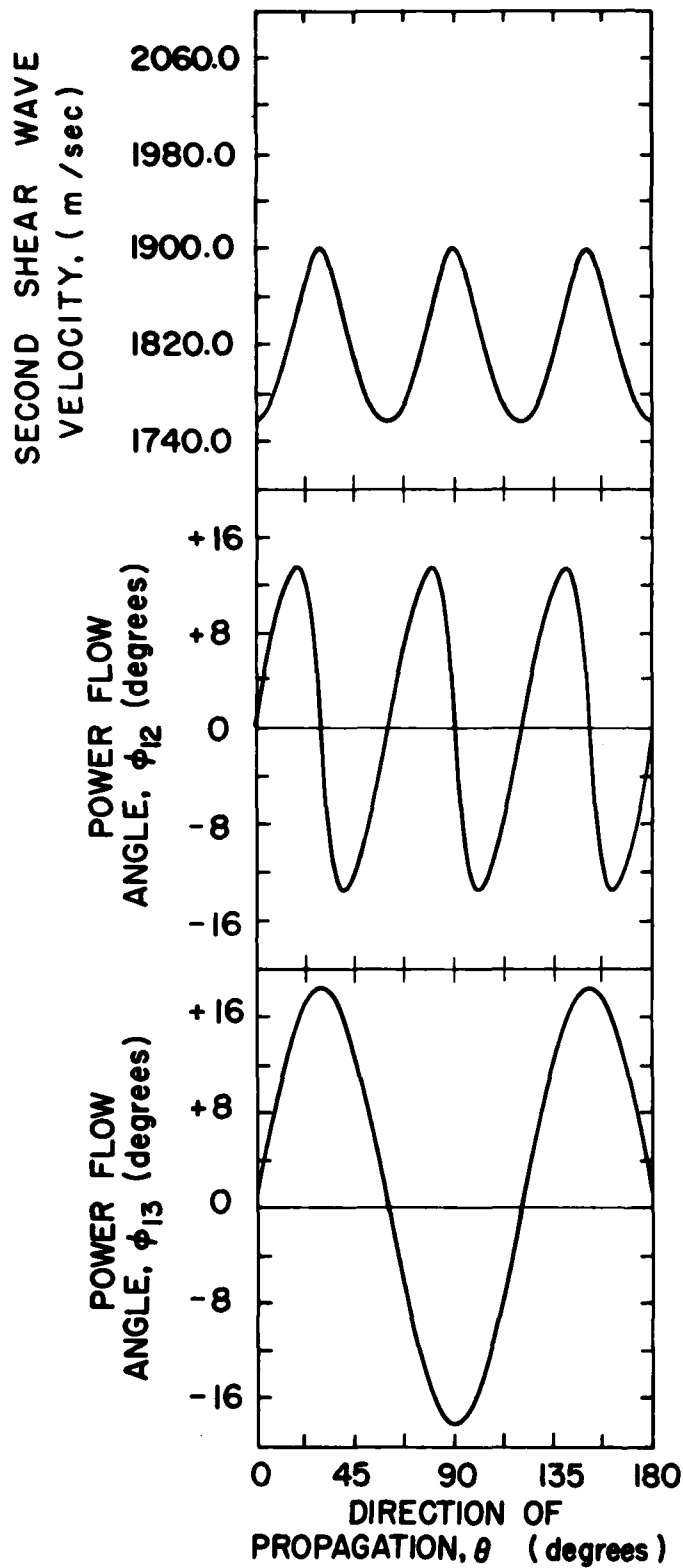
III-PLANE
 $\text{Bi}_{12}\text{GeO}_{20}$
(Slobodnik and Sethares)

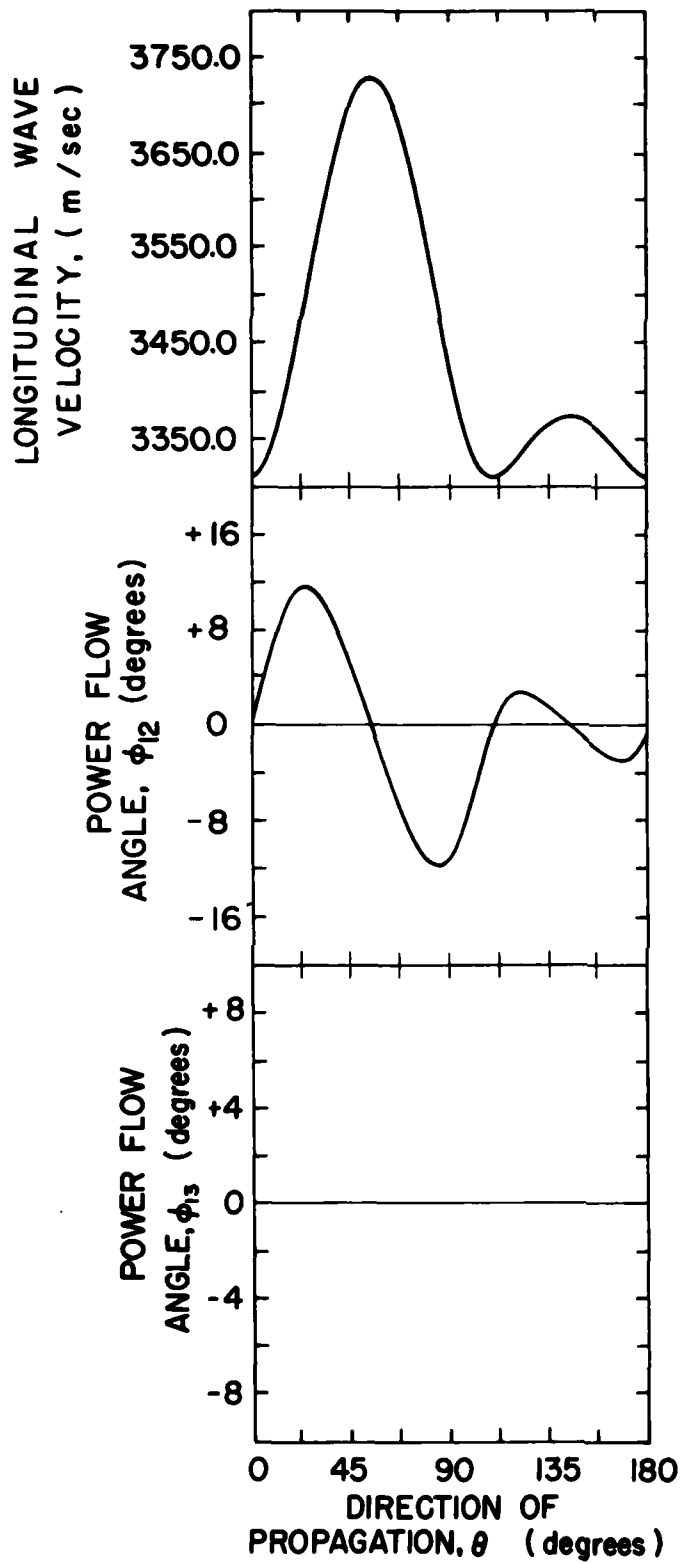




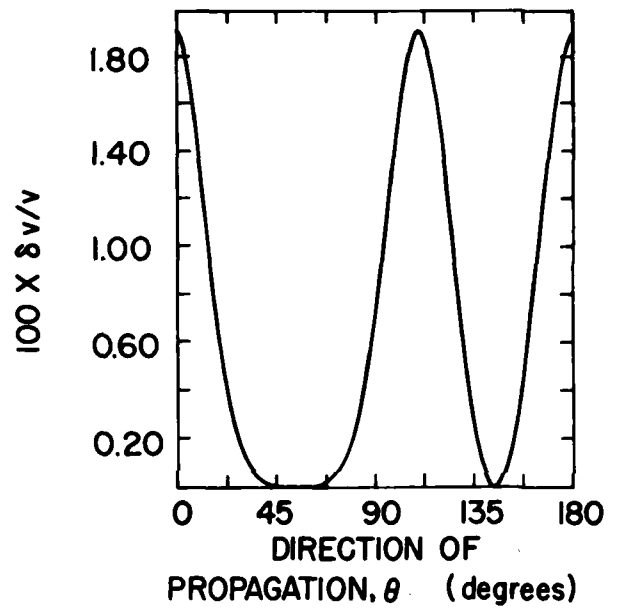
III-PLANE
 $\text{Bi}_{12}\text{GeO}_{20}$
(Slobodnik and Sethares)

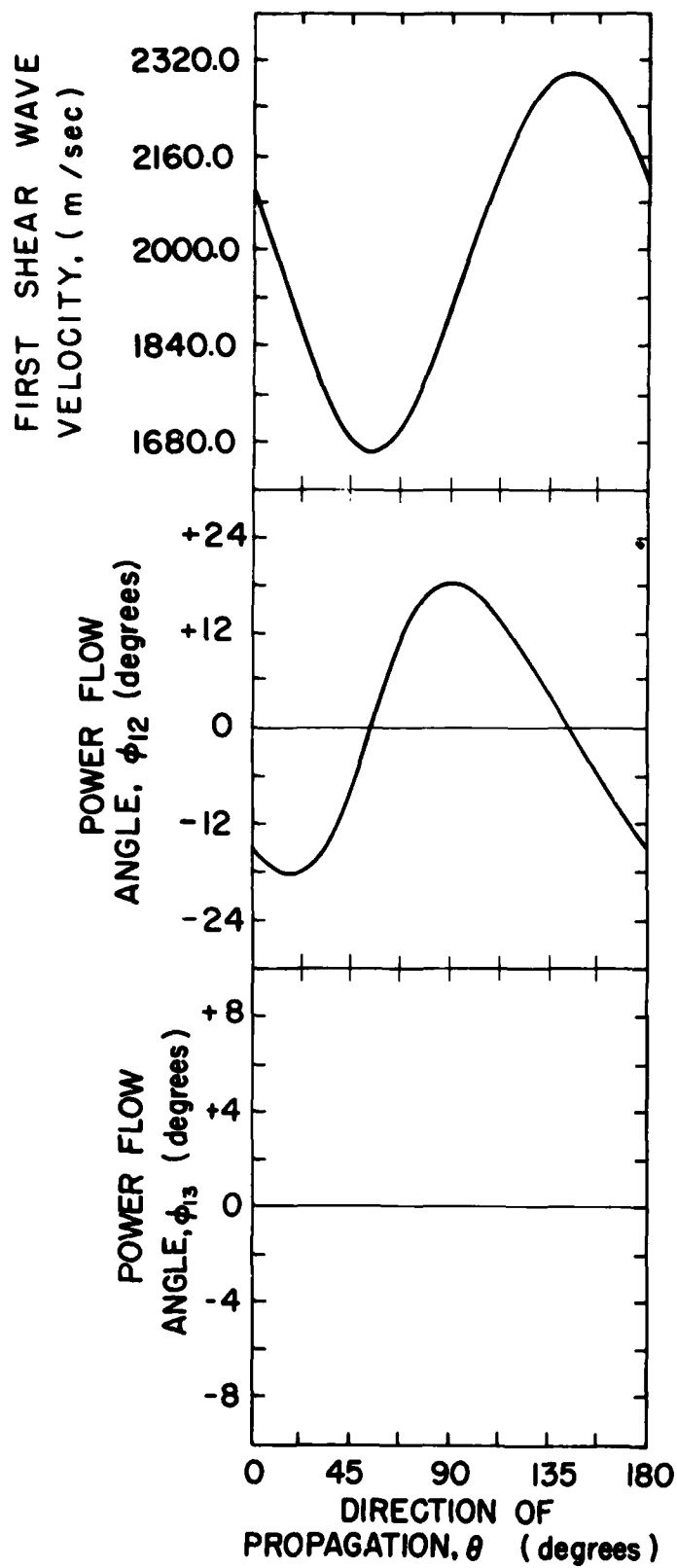




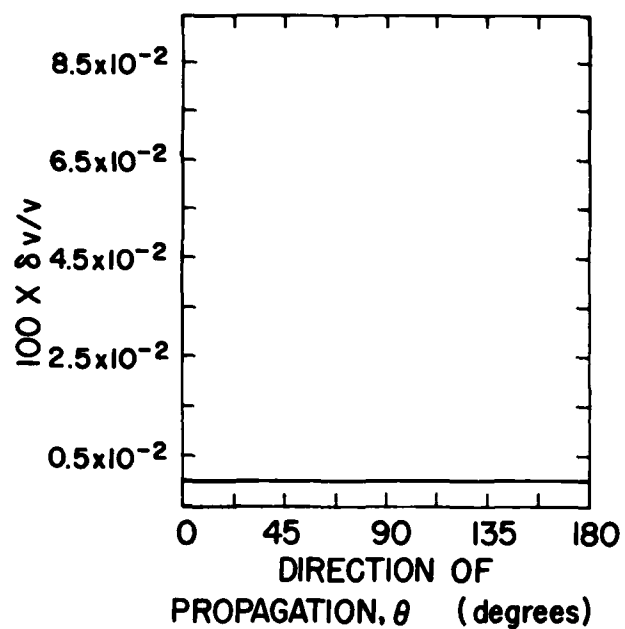


110 - PLANE
 $\text{Bi}_{12}\text{GeO}_{20}$
 (Slobodnik and Sethares)

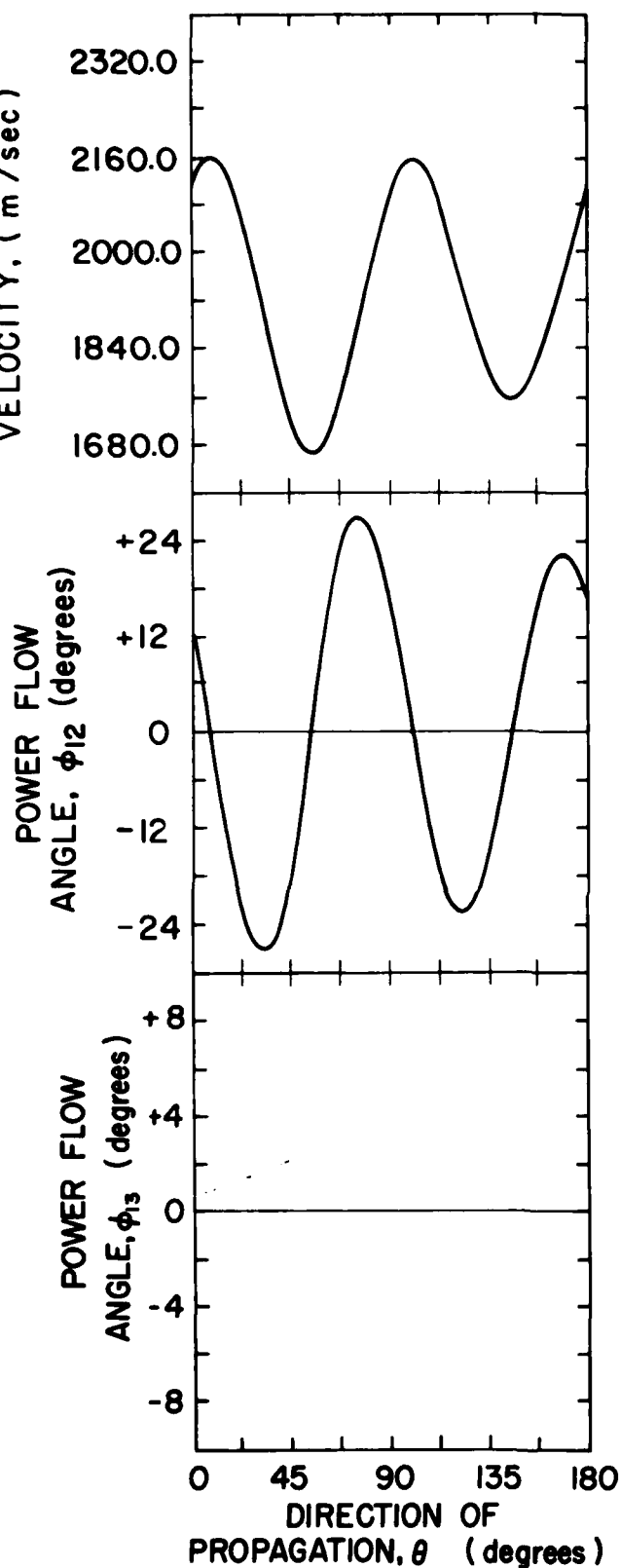




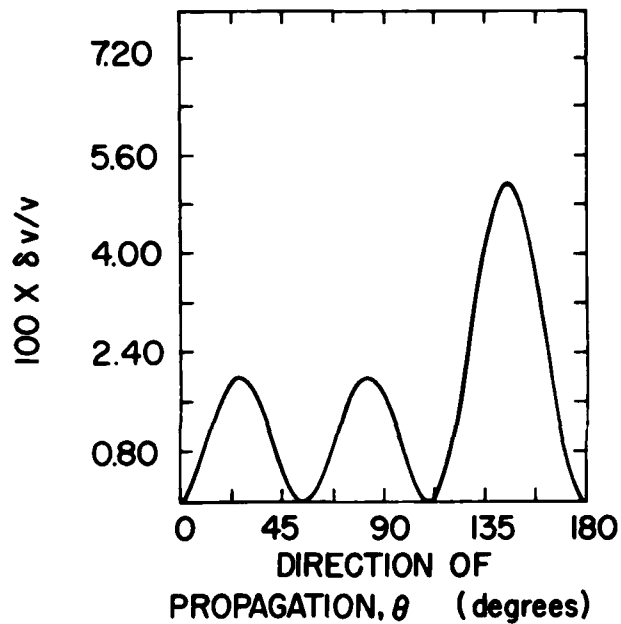
110 - PLANE
 $\text{Bi}_{12}\text{GeO}_{20}$
(Slobodnik and Sethares)



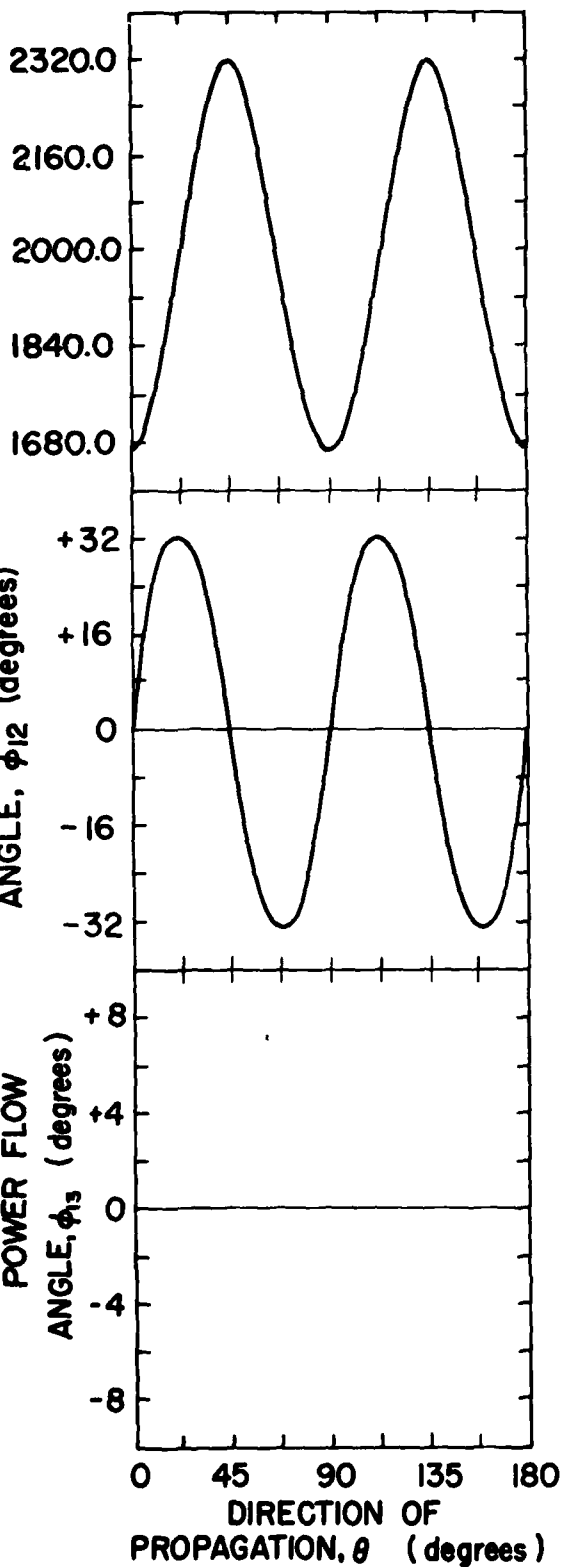
SECOND SHEAR WAVE
VELOCITY, (m / sec)



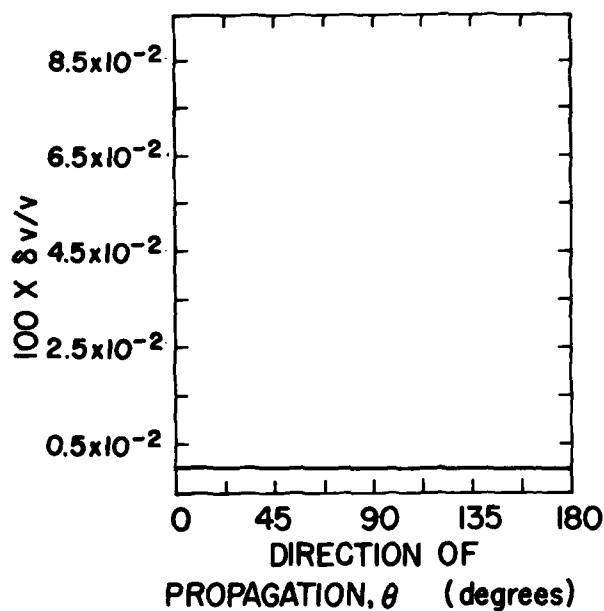
110 - PLANE
 $\text{Bi}_{12}\text{GeO}_{20}$
(Slobodnik and Sethares)



SECOND SHEAR WAVE
VELOCITY, (m/sec)



Z-PLANE
 $\text{Bi}_{12}\text{GeO}_{20}$
(Kraut et al)



LONGITUDINAL WAVE
VELOCITY, (m / sec)

3432.0
3416.0
3400.0
3384.0
3368.0

POWER FLOW
ANGLE, ϕ_2 (degrees)

+8
+4
0
-4
-8

POWER FLOW
ANGLE, ϕ_{13} (degrees)

+16
+8
0
-8
-16

0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

III-PLANE
 $\text{Bi}_{12}\text{GeO}_{20}$
(Kraut et al)

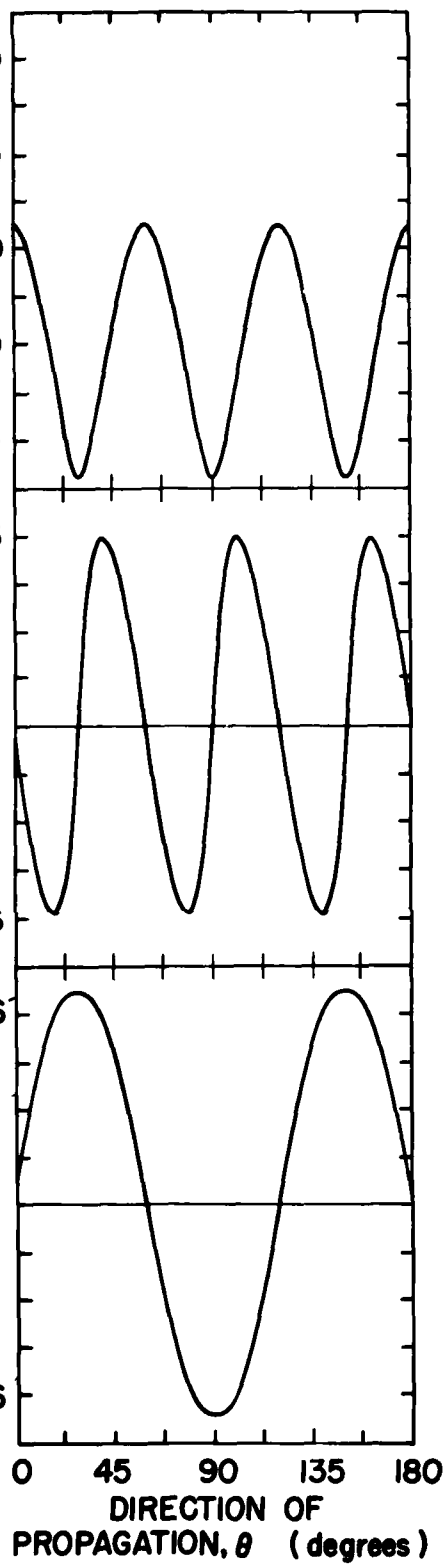
7.2×10^{-1}
 5.6×10^{-1}
 4.0×10^{-1}
 2.4×10^{-1}
 0.8×10^{-1}

0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

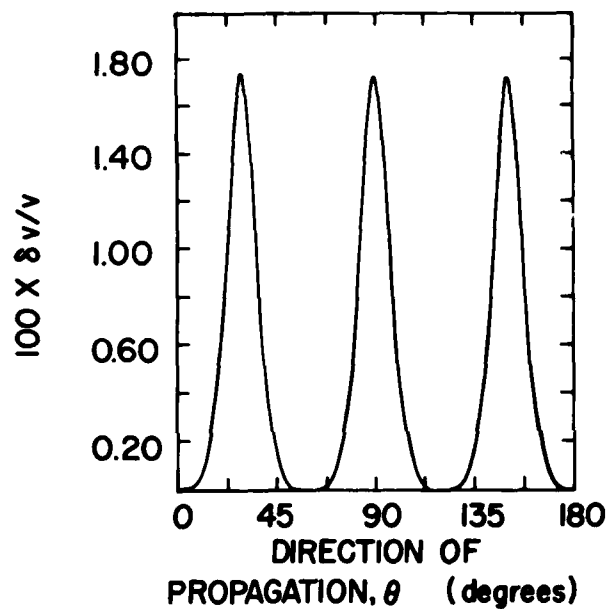
FIRST SHEAR WAVE
VELOCITY, (m / sec)

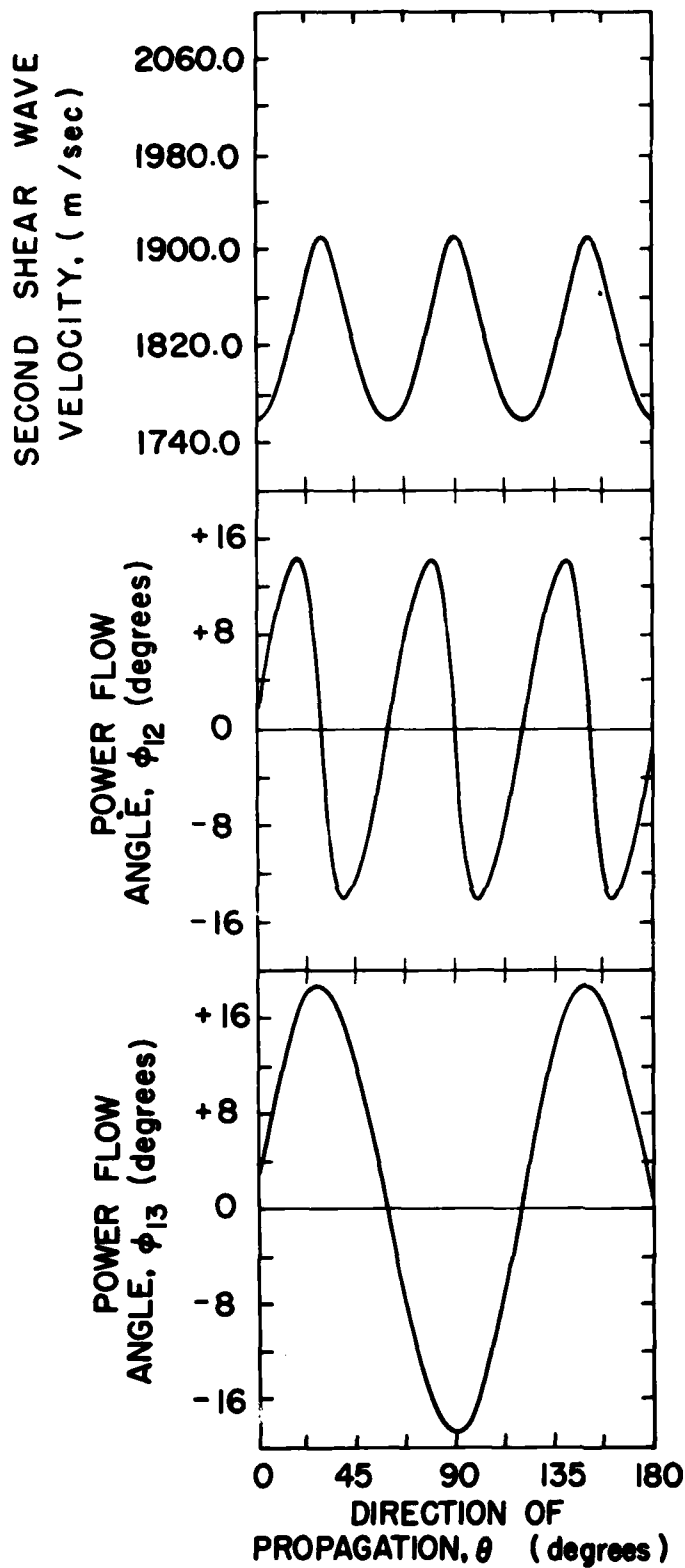
POWER FLOW
ANGLE, ϕ_{12} (degrees)

POWER FLOW
ANGLE, ϕ_{13} (degrees)

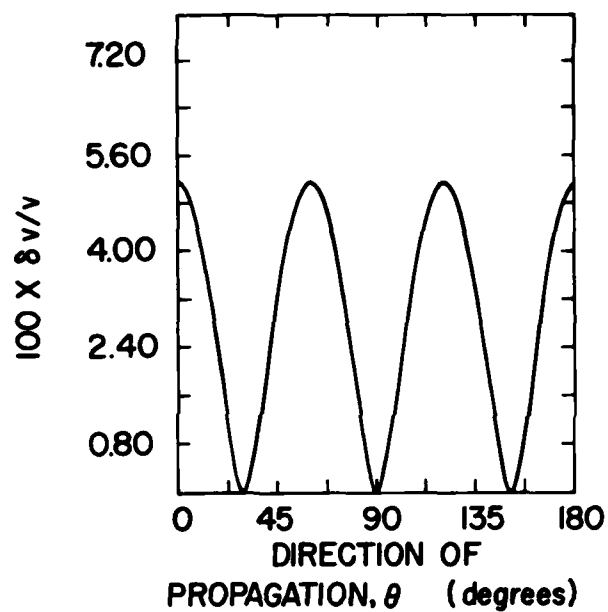


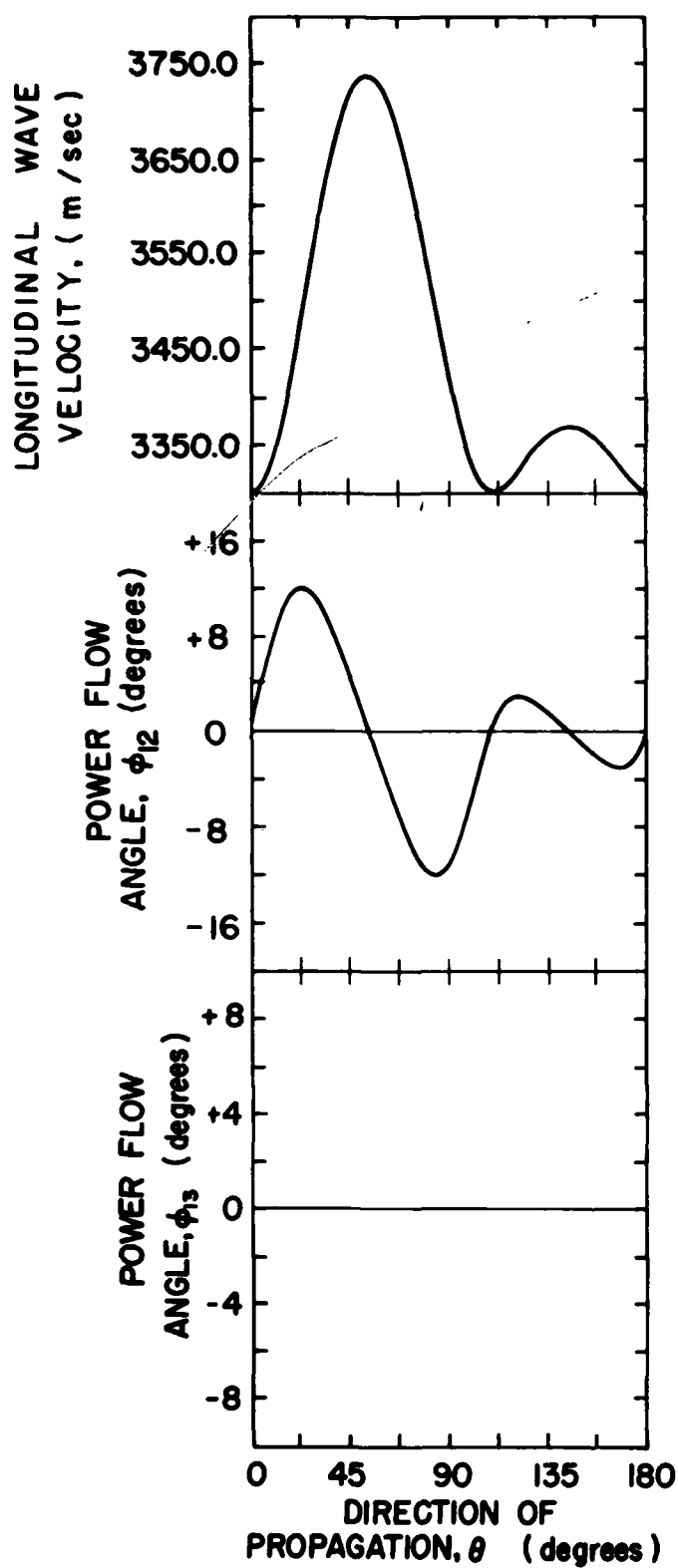
III-PLANE
 $\text{Bi}_{12}\text{GeO}_{20}$
(Kraut et al)



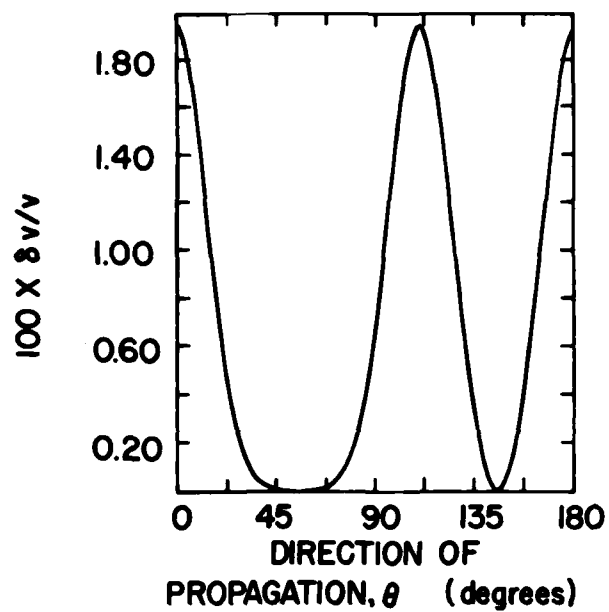


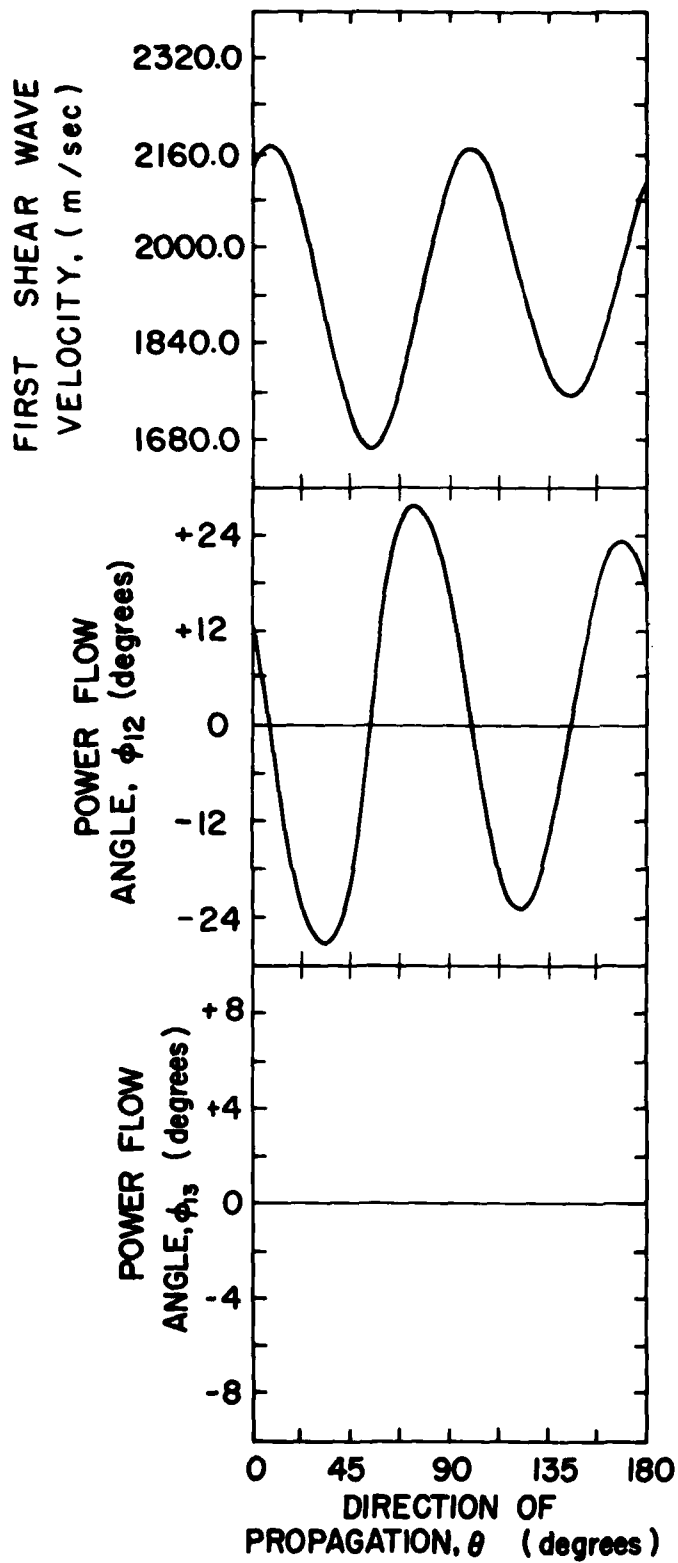
III-PLANE
 $\text{Bi}_{12}\text{GeO}_{20}$
(Kraut et al)



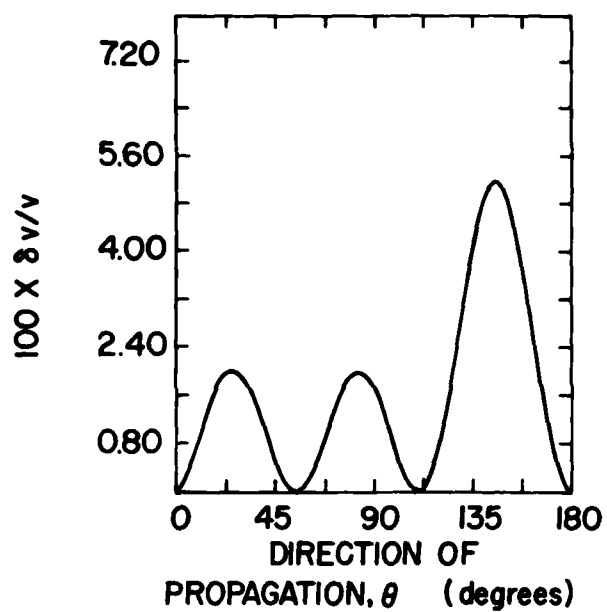


110 - PLANE
 $\text{Bi}_{12}\text{GeO}_{20}$
(Kraut et al)

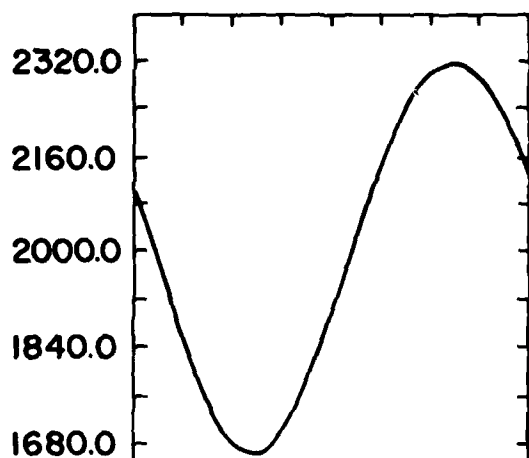




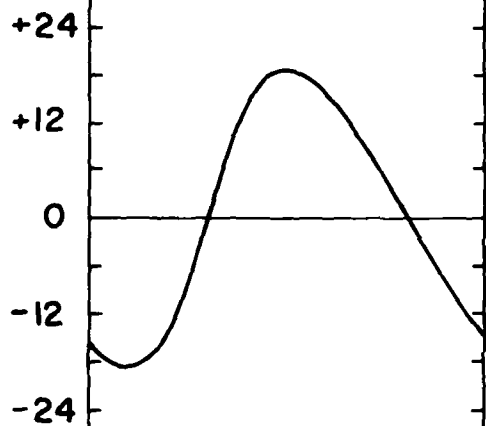
110 - PLANE
 $\text{Bi}_{12}\text{GeO}_{20}$
(Kraut et al)



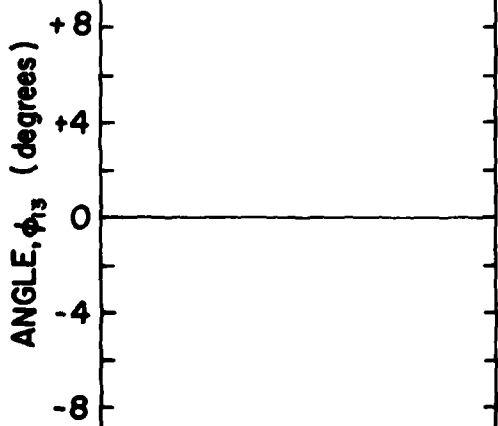
SECOND SHEAR WAVE
VELOCITY, (m/sec)



POWER FLOW
ANGLE, ϕ_{12} (degrees)

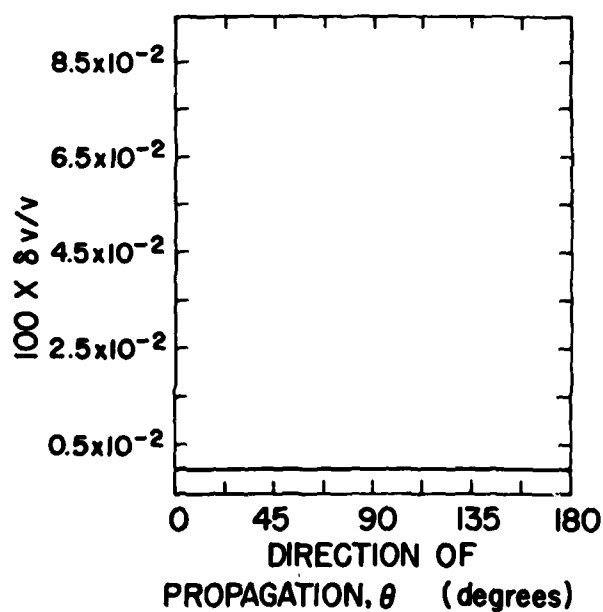


POWER FLOW
ANGLE, ϕ_{13} (degrees)

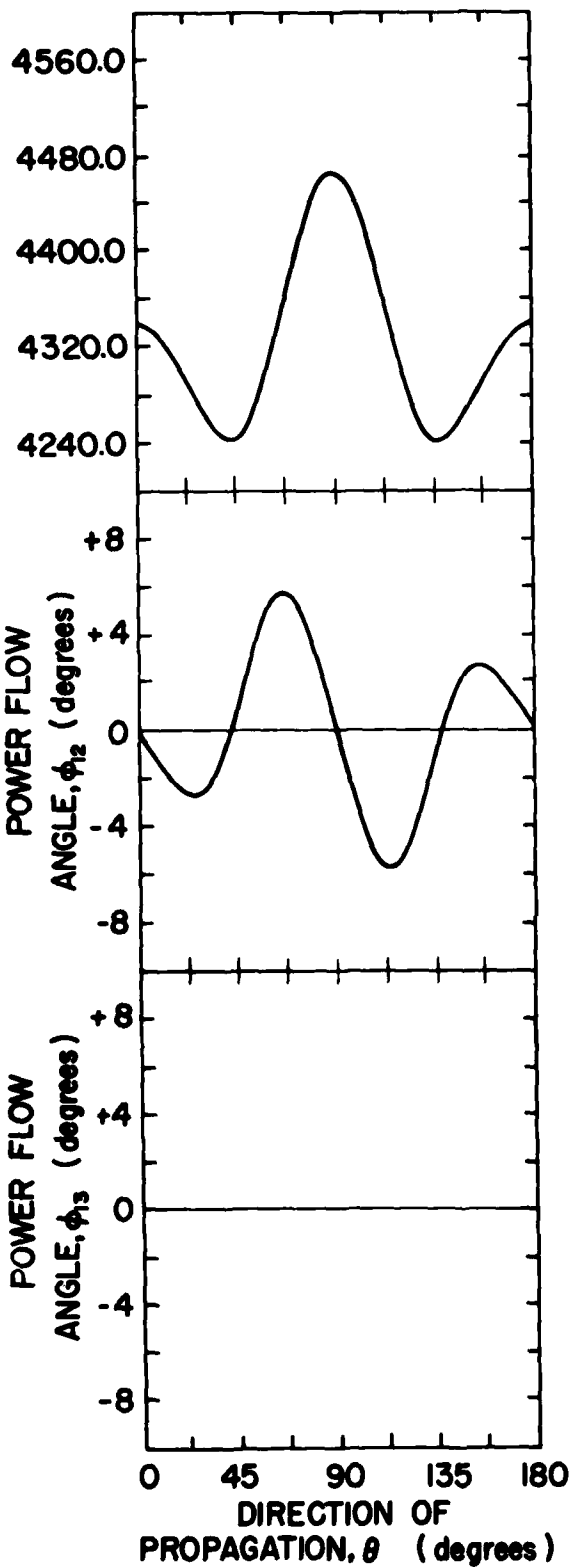


DIRECTION OF
PROPAGATION, θ (degrees)

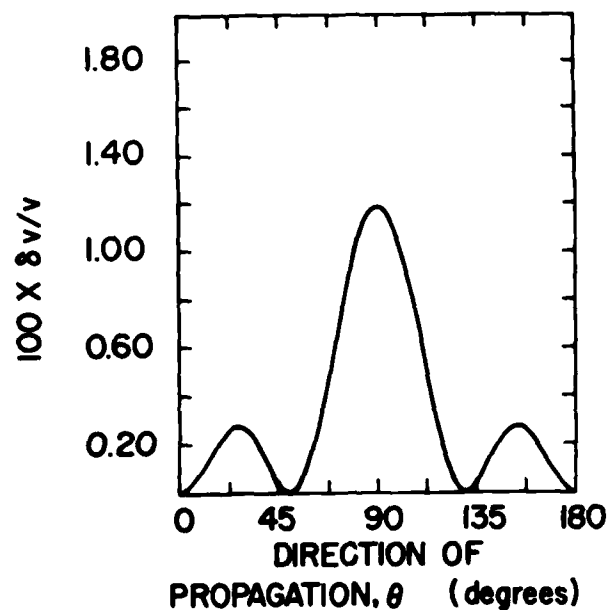
110 - PLANE
 $\text{Bi}_{12}\text{GeO}_{20}$
(Kraut et al)

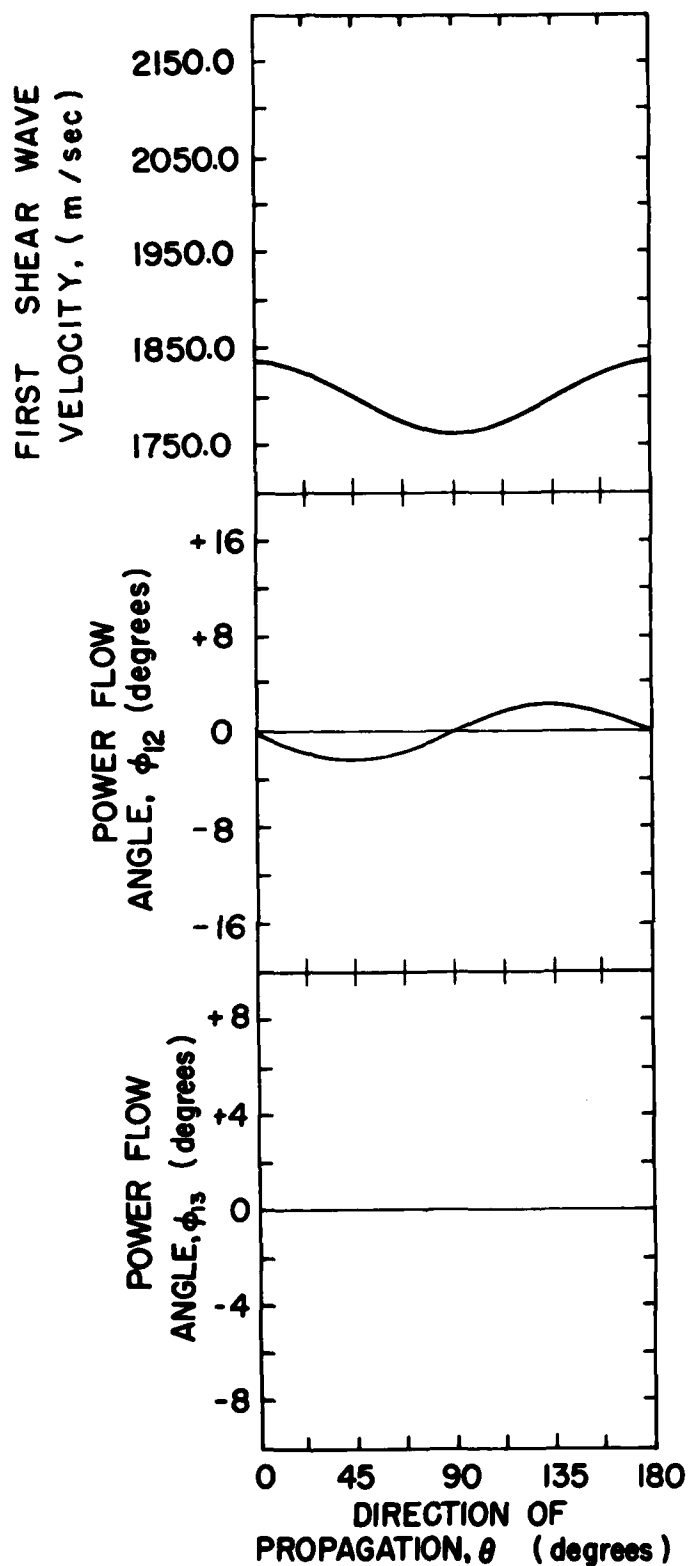


LONGITUDINAL WAVE
VELOCITY, (m / sec)

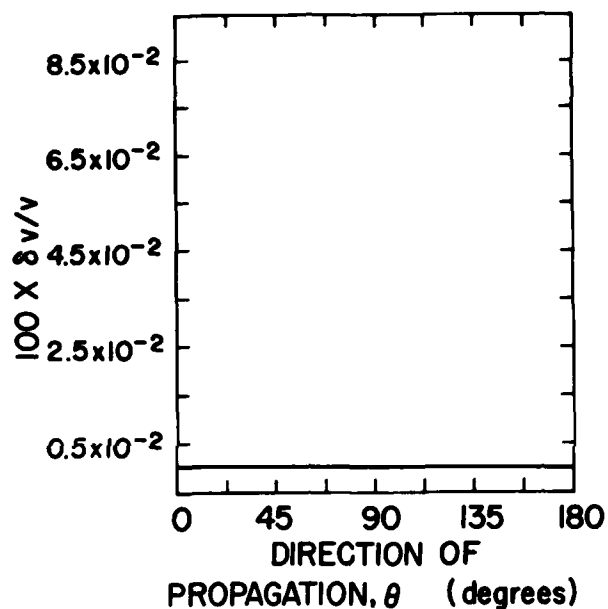


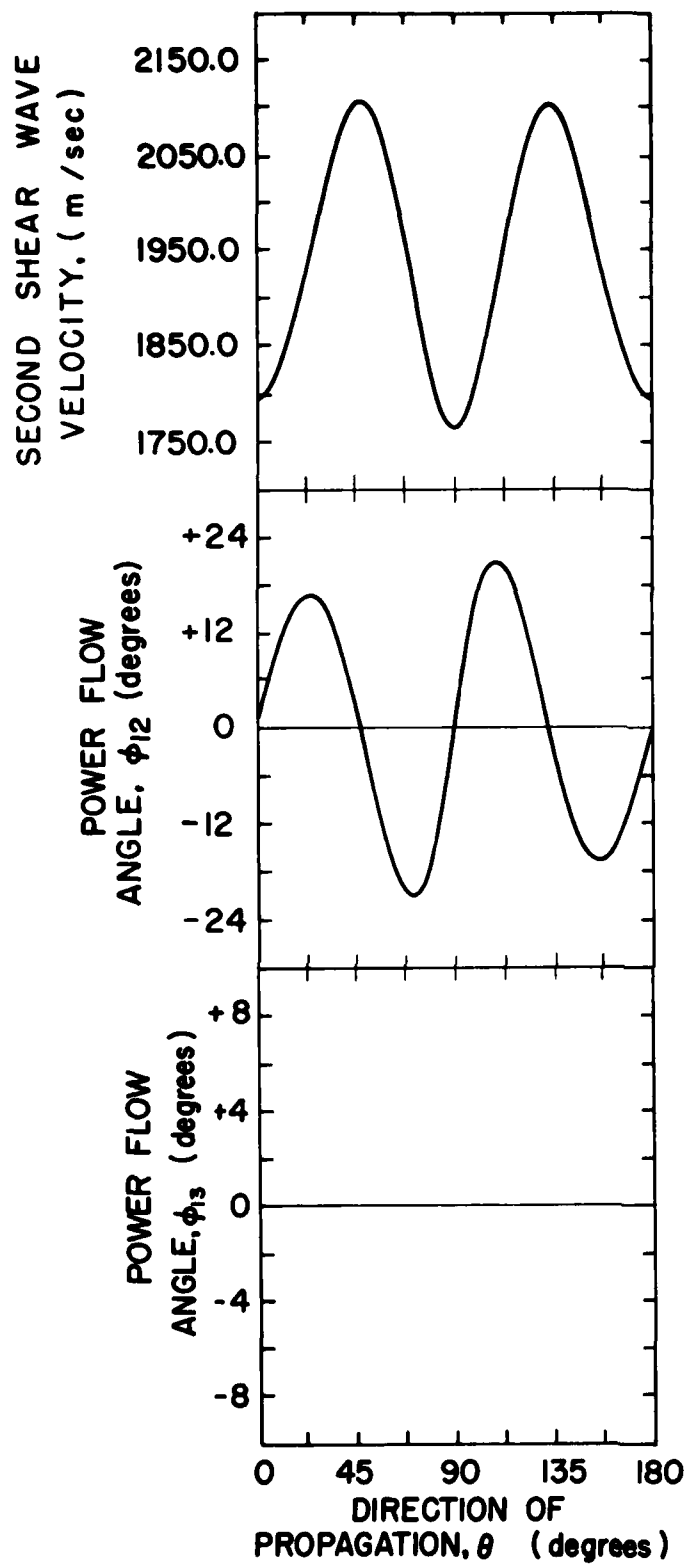
X-PLANE AND Y-PLANE
CdS



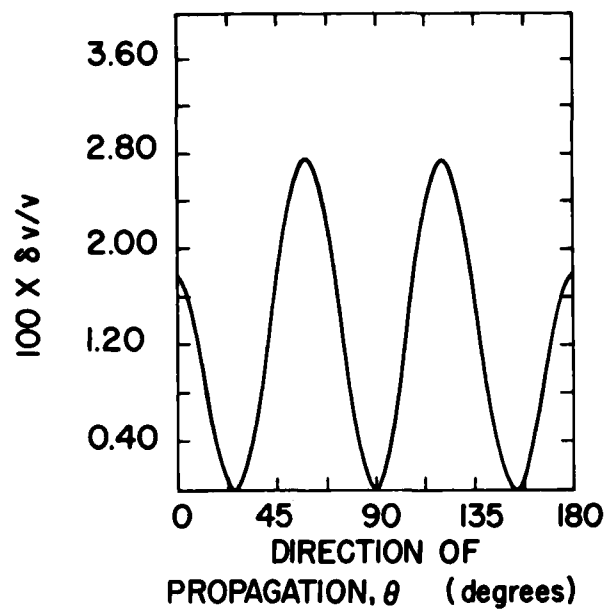


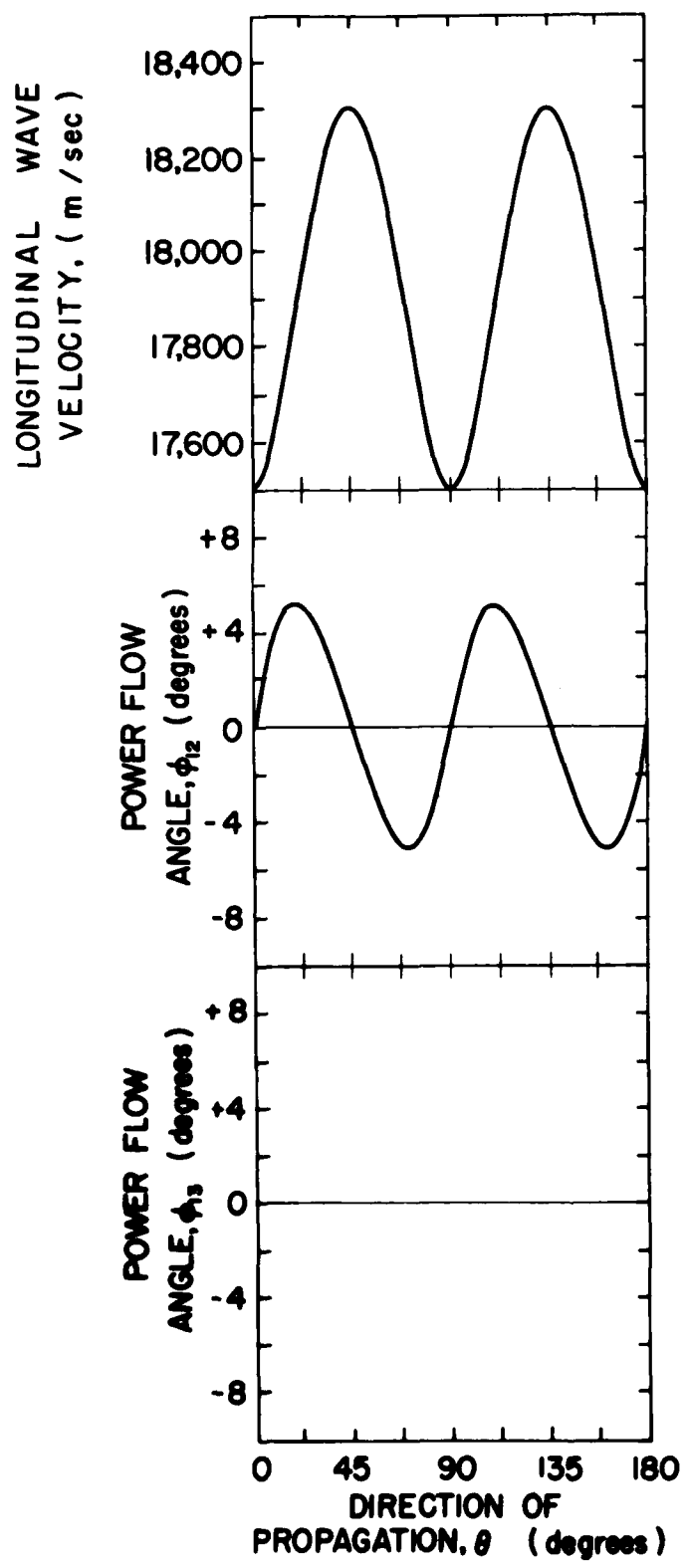
X-PLANE AND Y-PLANE CdS





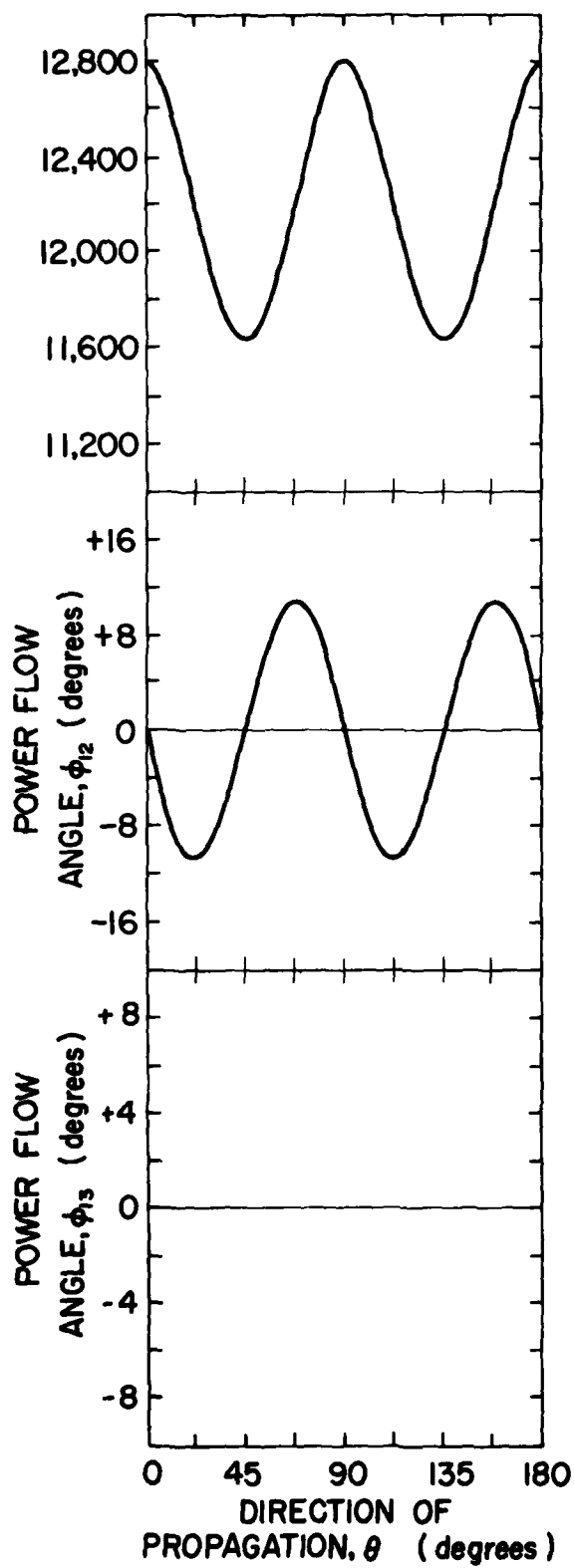
X-PLANE AND Y-PLANE CdS



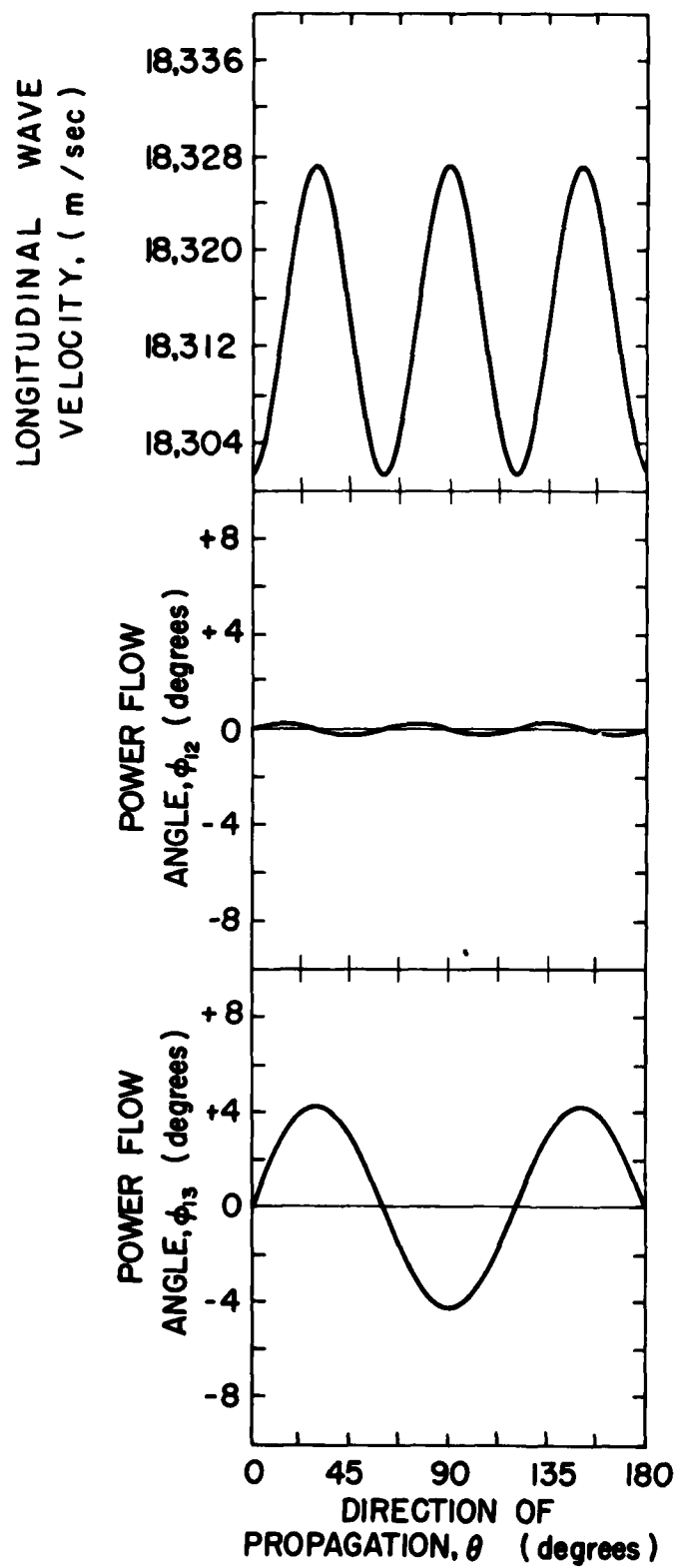


Z-PLANE
DIAMOND

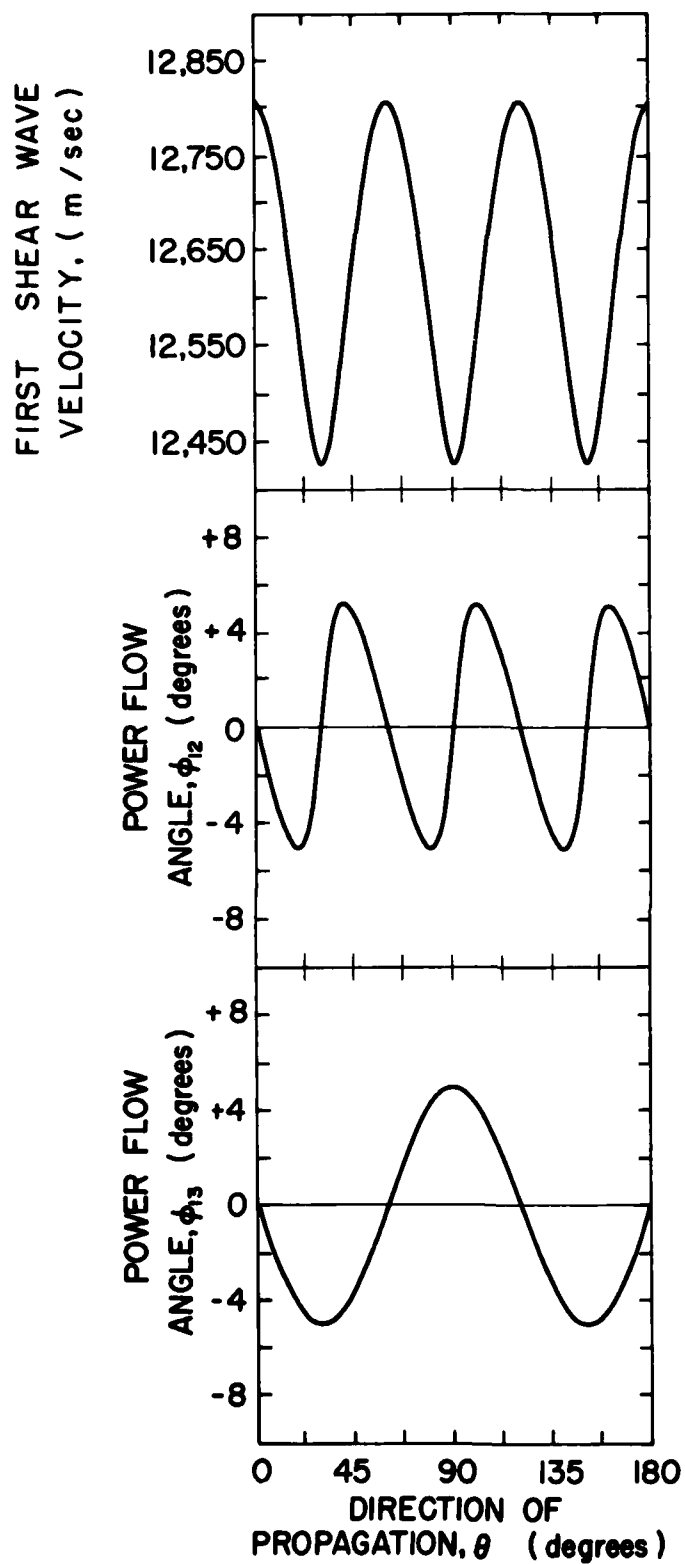
SECOND SHEAR WAVE
VELOCITY, (m / sec)



Z-PLANE
DIAMOND

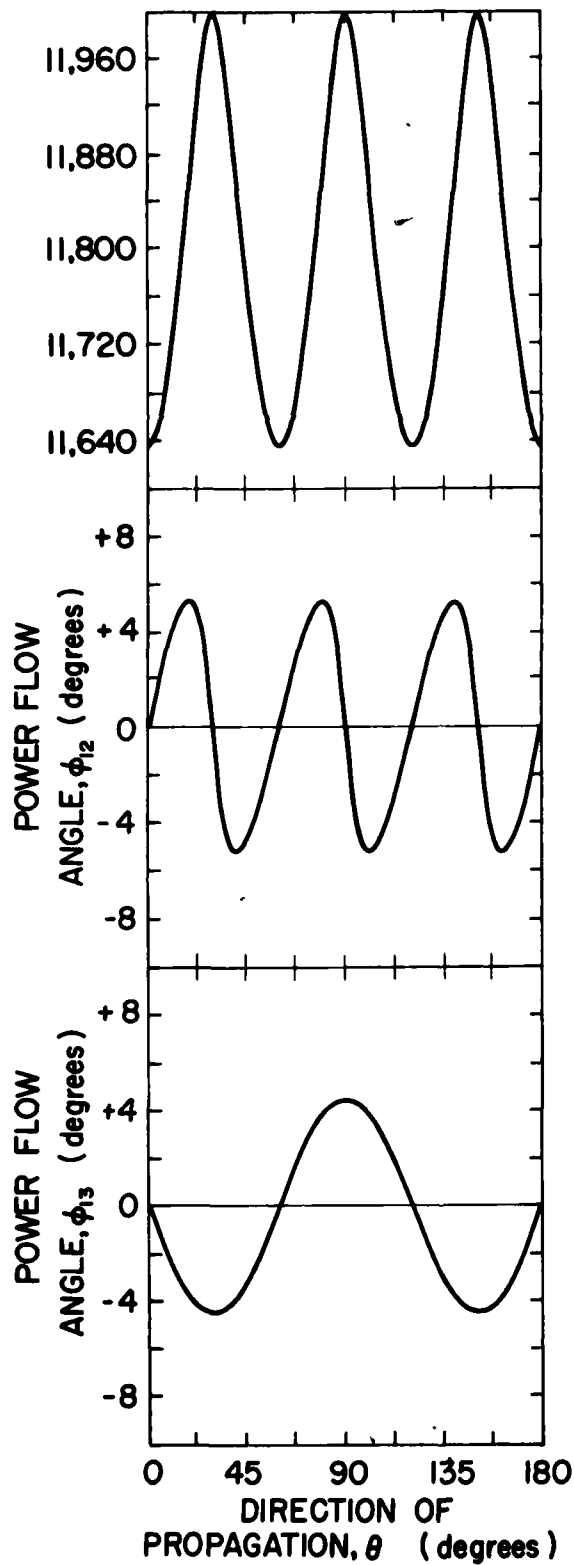


III-PLANE
DIAMOND

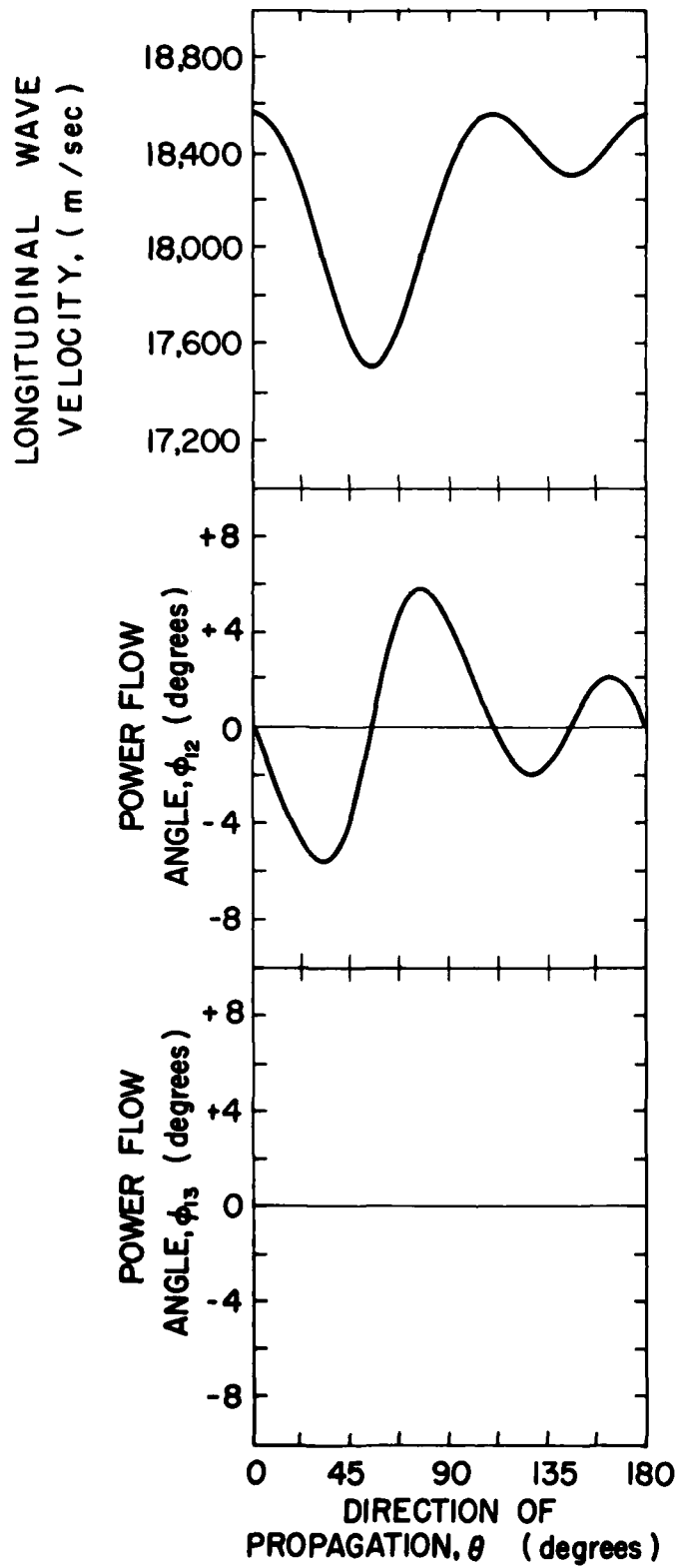


III-PLANE
DIAMOND

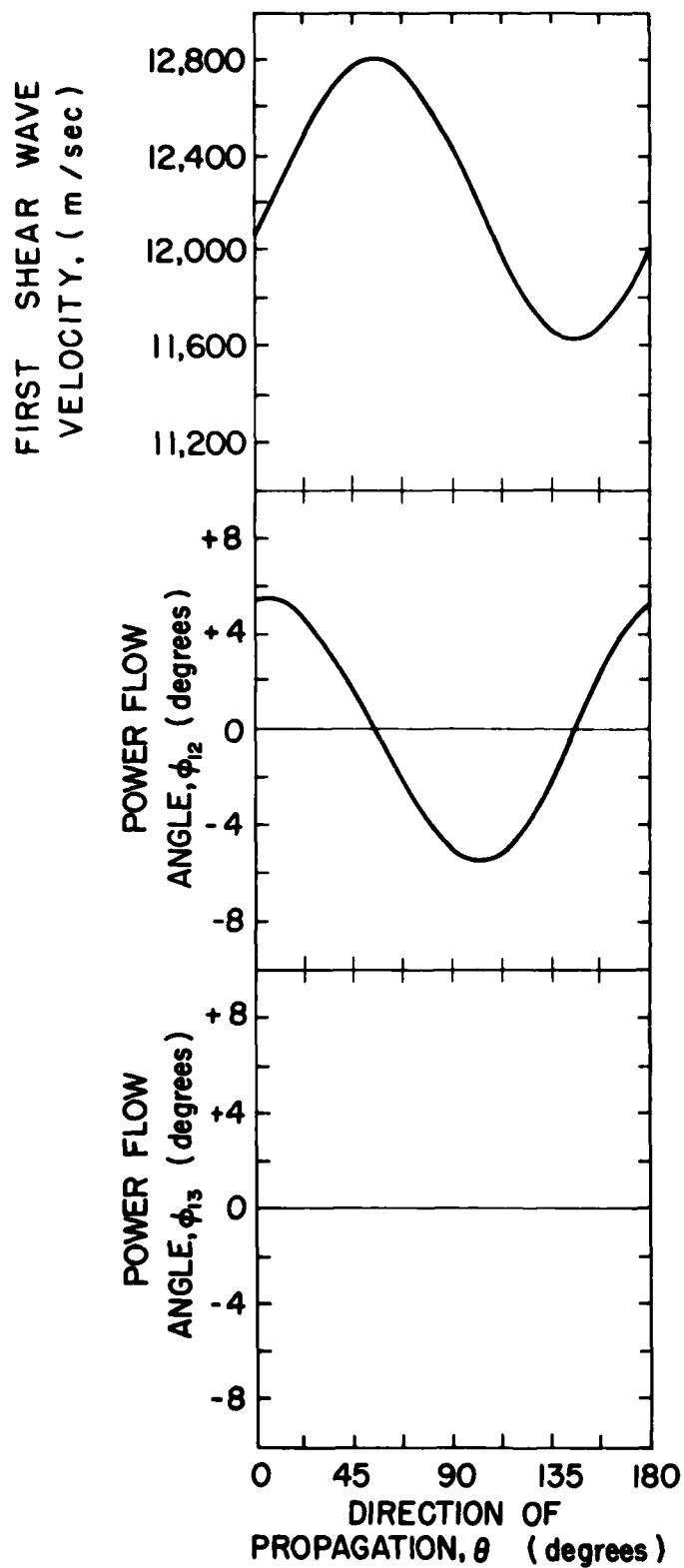
SECOND SHEAR WAVE
VELOCITY, (m / sec)



III-PLANE
DIAMOND

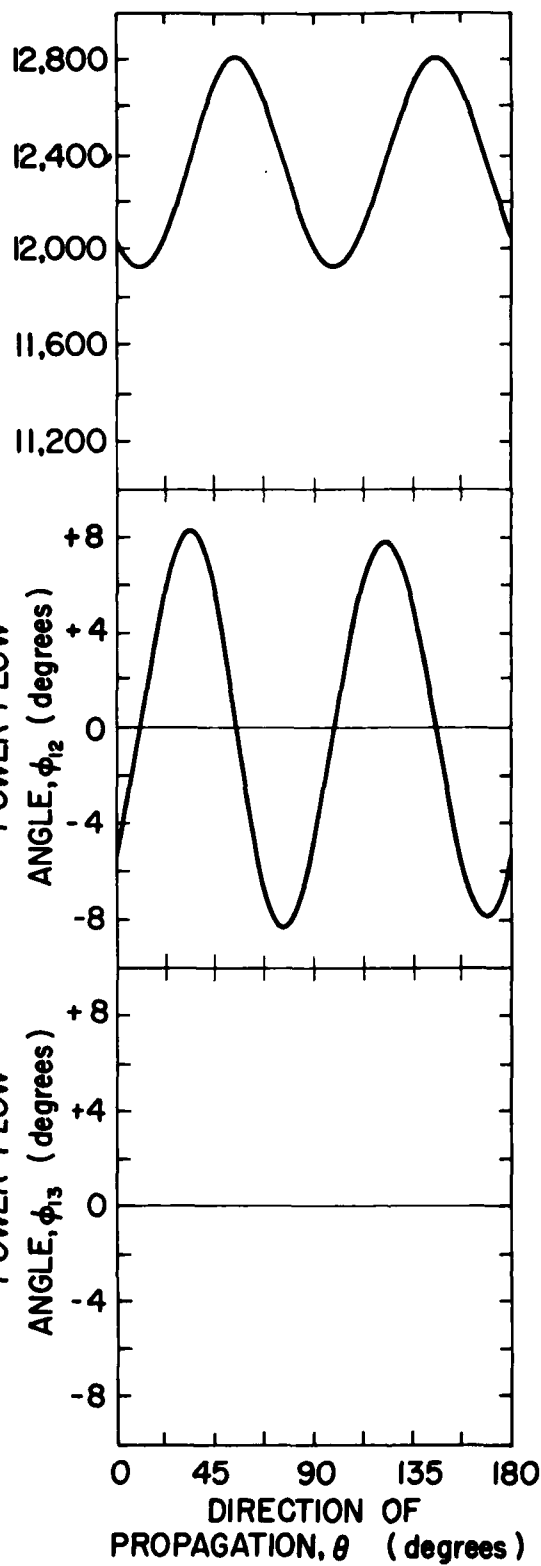


IIO-PLANE
DIAMOND

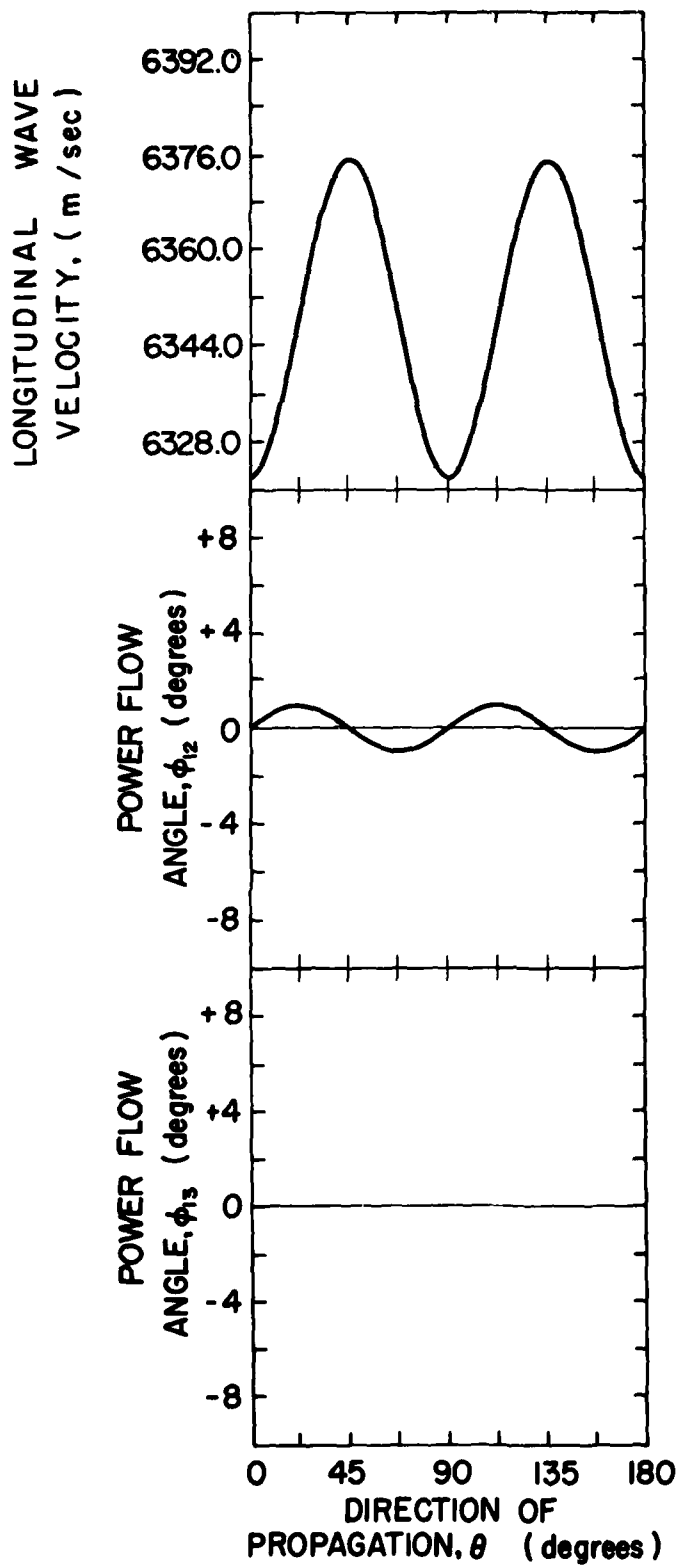


110-PLANE
DIAMOND

SECOND SHEAR WAVE
VELOCITY, (m / sec)



110-PLANE
DIAMOND



Z - PLANE
 $\text{Eu}_3\text{Fe}_5\text{O}_{12}$

SECOND SHEAR WAVE
VELOCITY, (m / sec)

3560.0
3520.0
3480.0
3440.0
3400.0

POWER FLOW
ANGLE, ϕ_{12} (degrees)

+8
+4
0
-4
-8

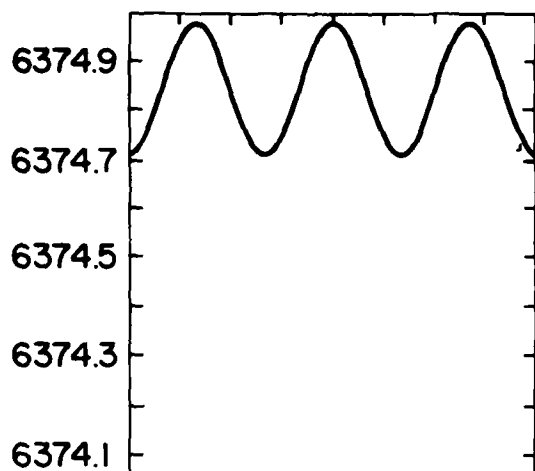
POWER FLOW
ANGLE, ϕ_{13} (degrees)

+8
+4
0
-4
-8

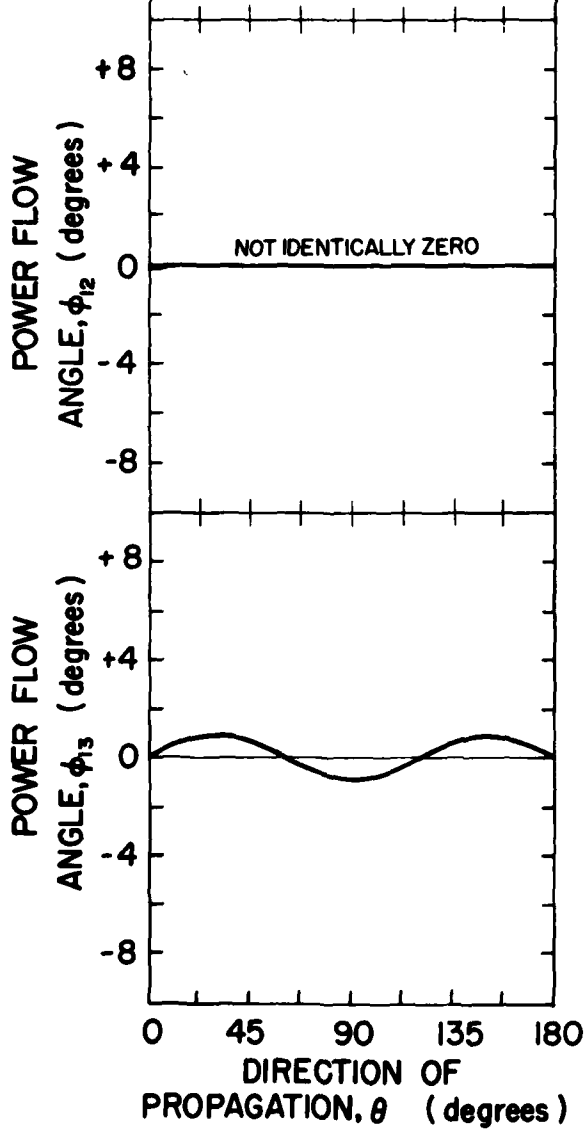
0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

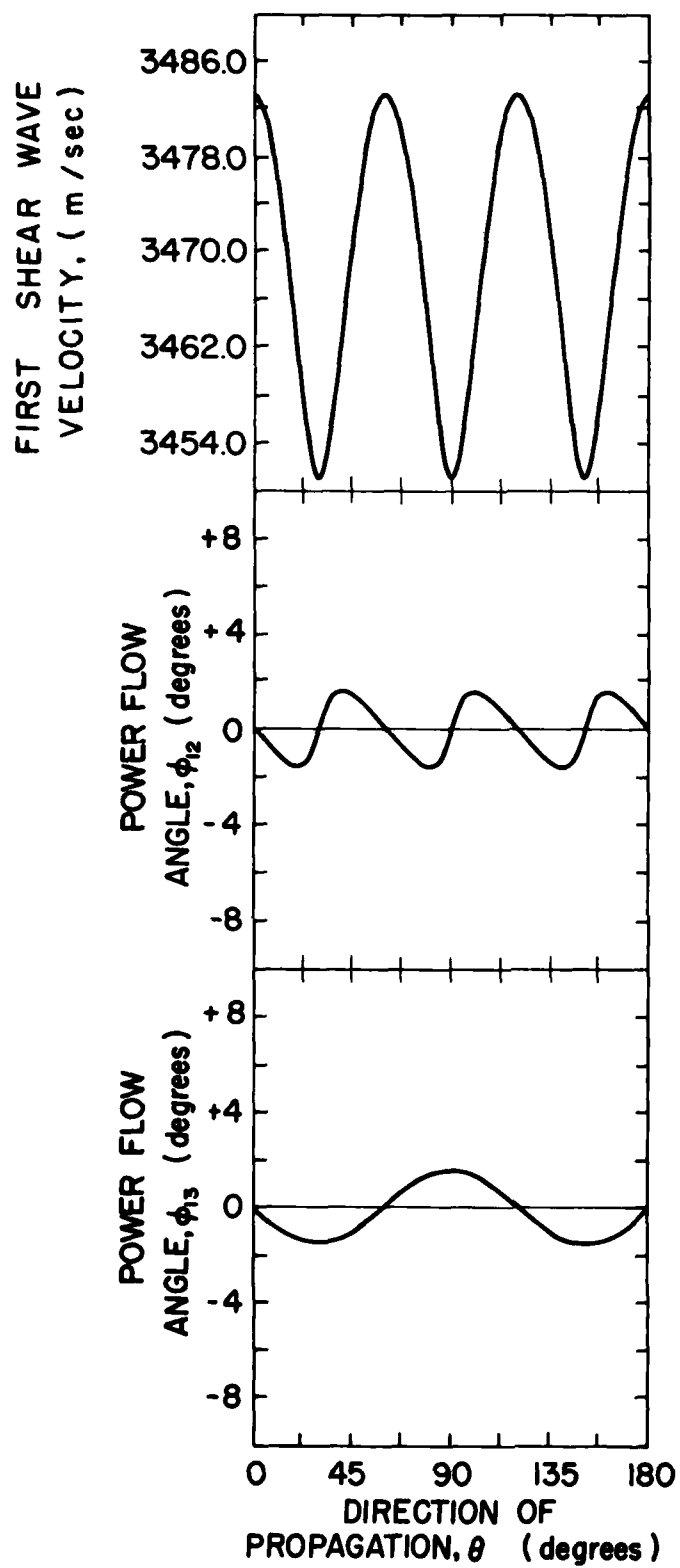
Z - PLANE
 $\text{Eu}_3\text{Fe}_5\text{O}_{12}$

LONGITUDINAL WAVE
VELOCITY, (m / sec)



III-PLANE
 $\text{Eu}_3\text{Fe}_5\text{O}_{12}$





III-PLANE
 $\text{Eu}_3\text{Fe}_5\text{O}_{12}$

SECOND SHEAR WAVE
VELOCITY. (m / sec)

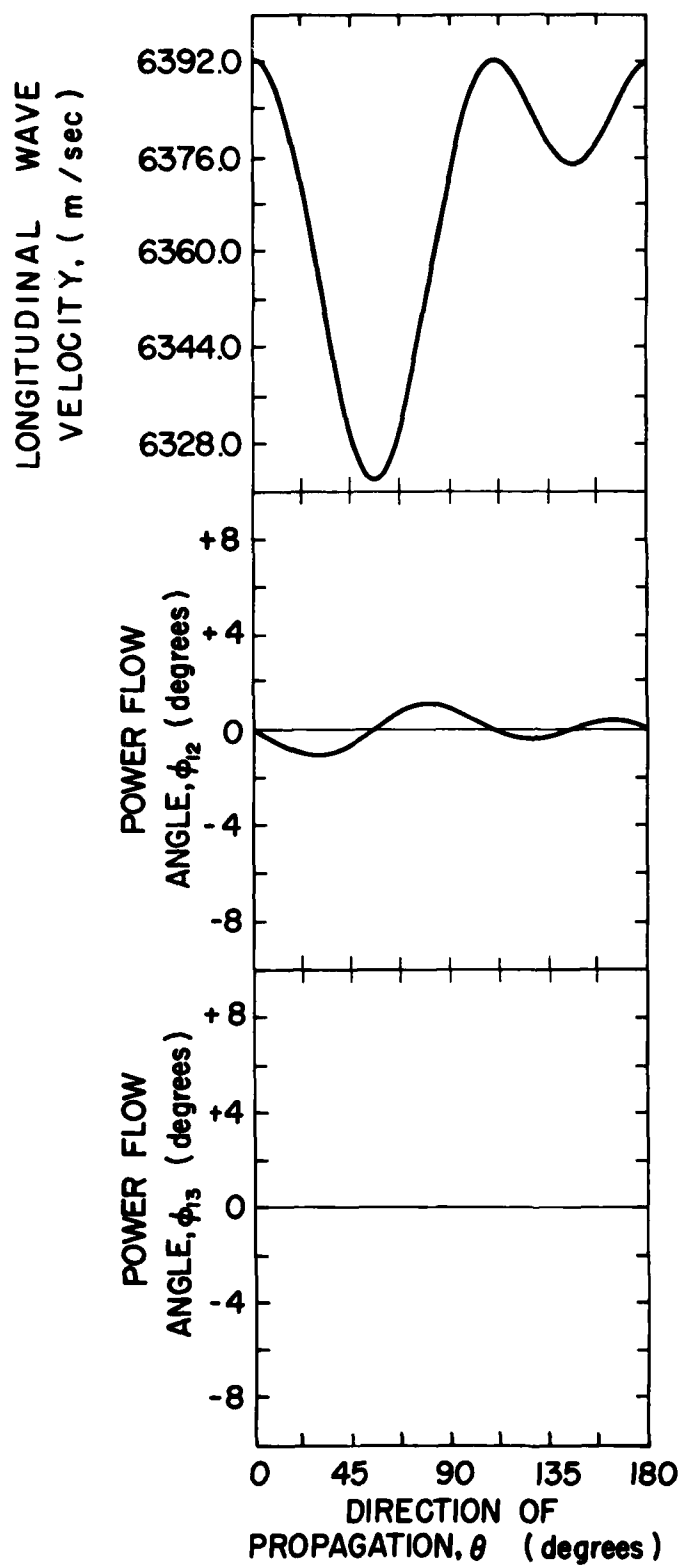
3416.0
3408.0
3400.0
3392.0
3384.0

III - PLANE
 $\text{Eu}_3\text{Fe}_5\text{O}_{12}$

POWER FLOW
ANGLE, ϕ_{12} (degrees)
+8
+4
0
-4
-8

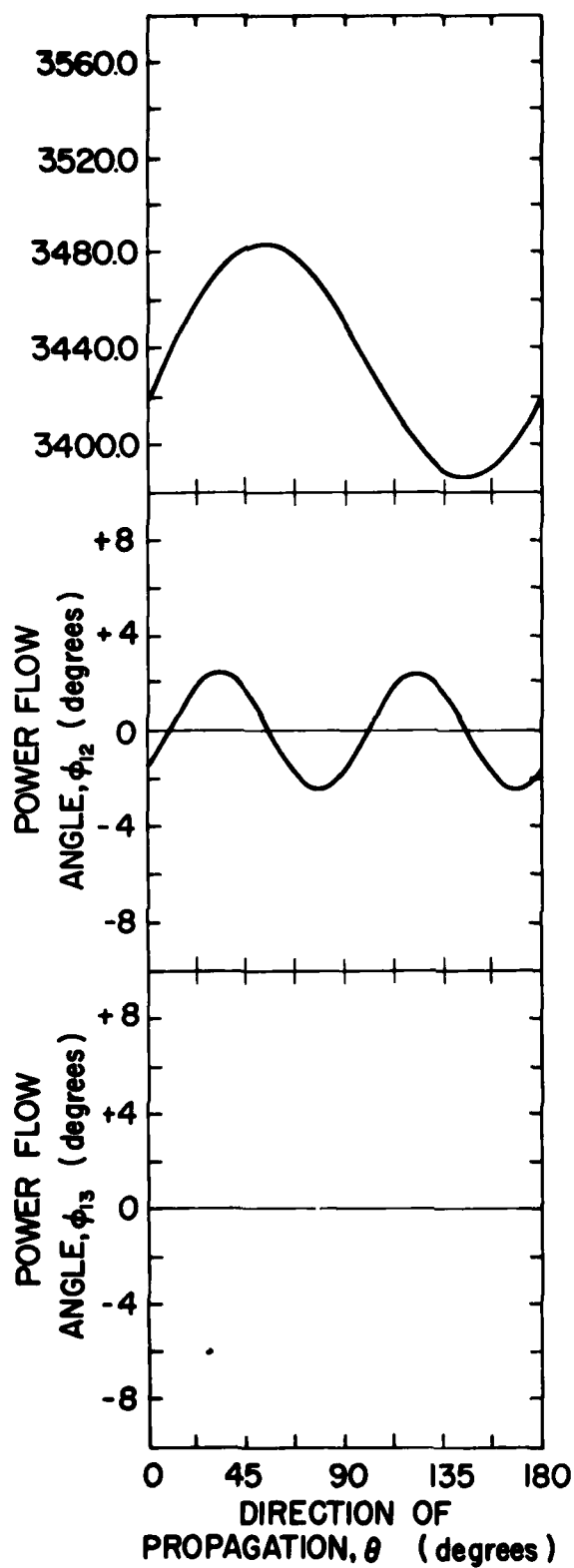
POWER FLOW
ANGLE, ϕ_{13} (degrees)
+8
+4
0
-4
-8

0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

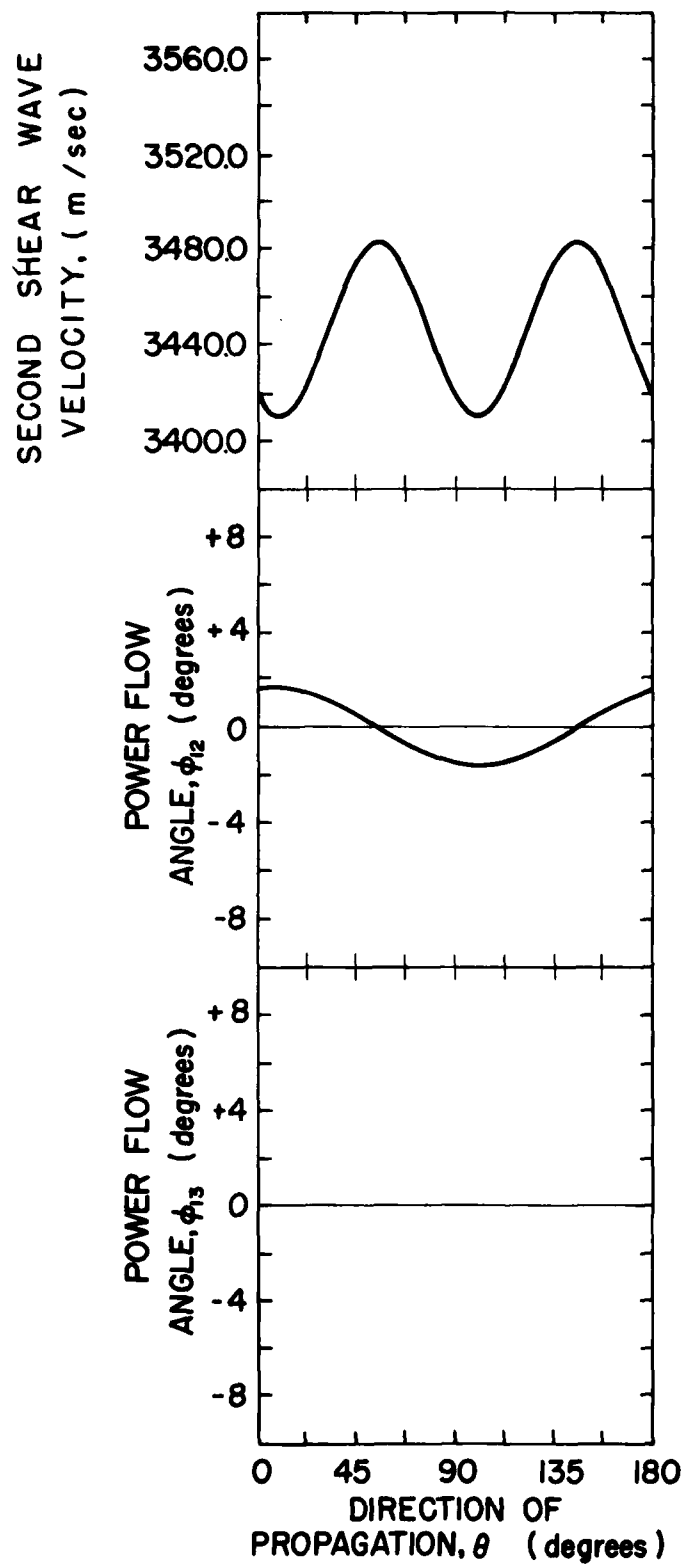


110 - PLANE
 $\text{Eu}_3\text{Fe}_5\text{O}_{12}$

FIRST SHEAR WAVE
VELOCITY, (m/sec)

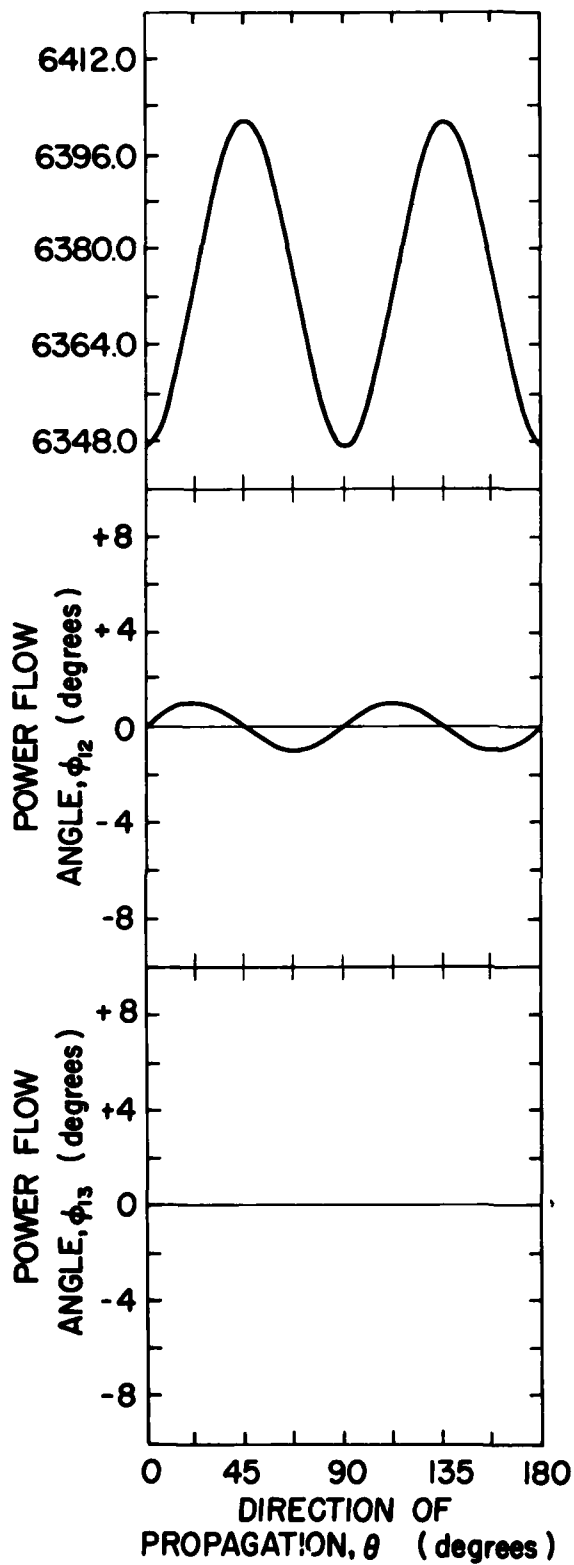


110-PLANE
 $\text{Eu}_3\text{Fe}_5\text{O}_{12}$



110-PLANE
 $\text{Eu}_3\text{Fe}_5\text{O}_{12}$

LONGITUDINAL WAVE
VELOCITY, (m / sec)



Z-PLANE
GADOLINIUM GALLIUM GARNET

SECOND SHEAR WAVE
VELOCITY, (m / sec)

3640.0
3600.0
3560.0
3520.0
3480.0

POWER FLOW
ANGLE, ϕ_{12} (degrees)

+8
+4
0
-4
-8

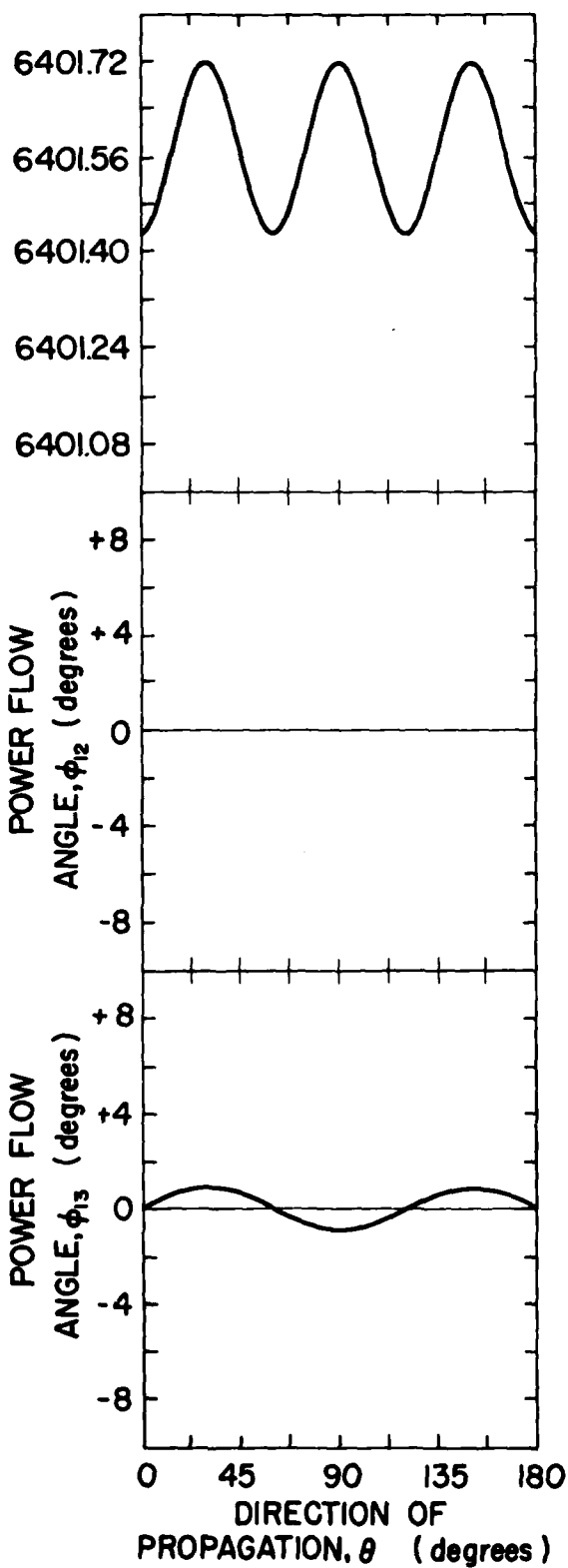
POWER FLOW
ANGLE, ϕ_{13} (degrees)

+8
+4
0
-4
-8

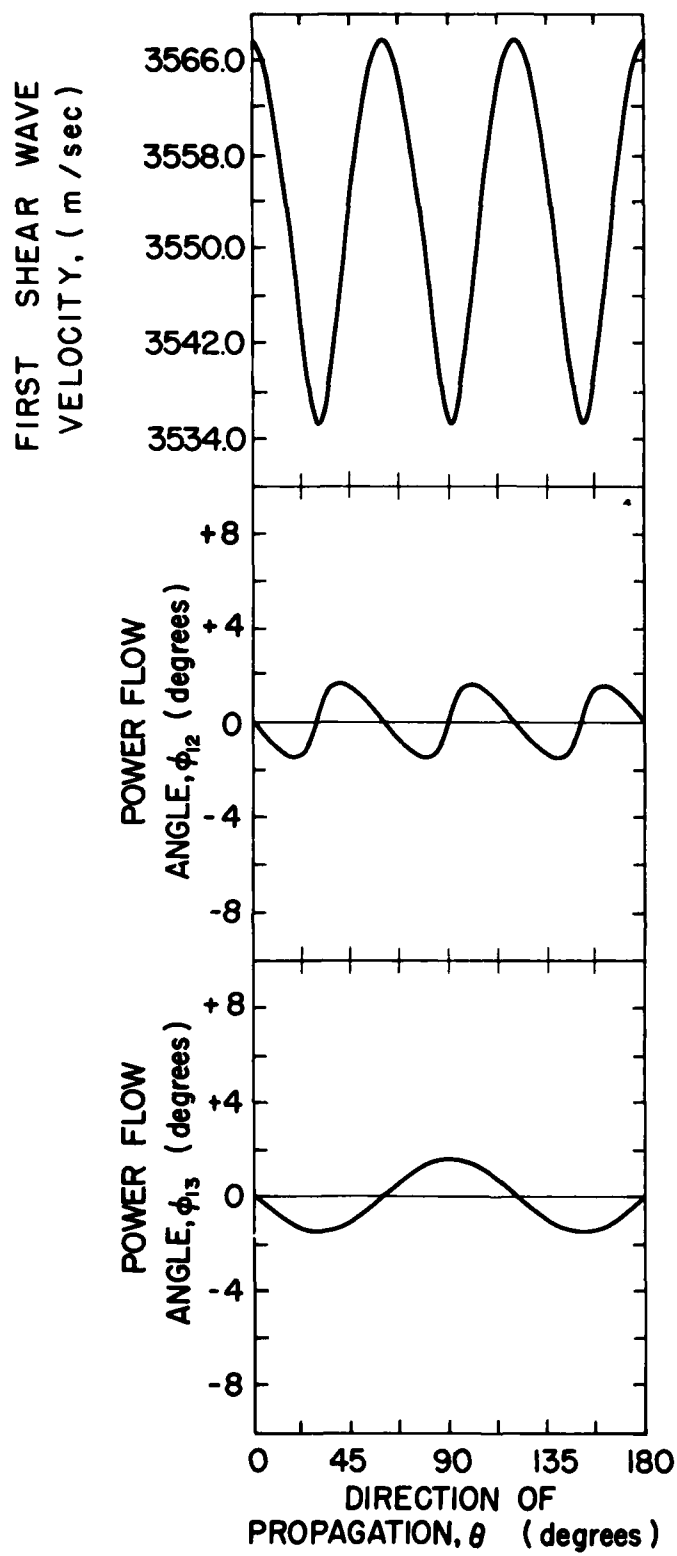
0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

Z-PLANE
GADOLINIUM GALLIUM GARNET

LONGITUDINAL WAVE
VELOCITY, (m / sec)

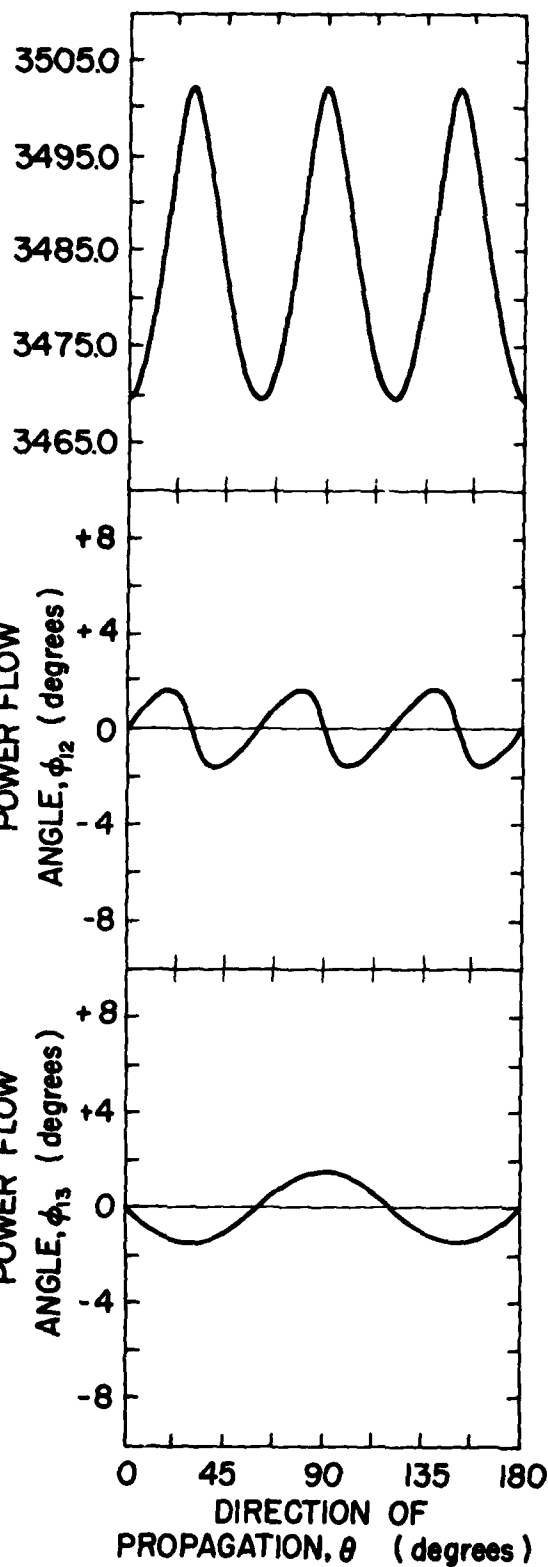


III-PLANE
GADOLIUM GALLIUM GARNET

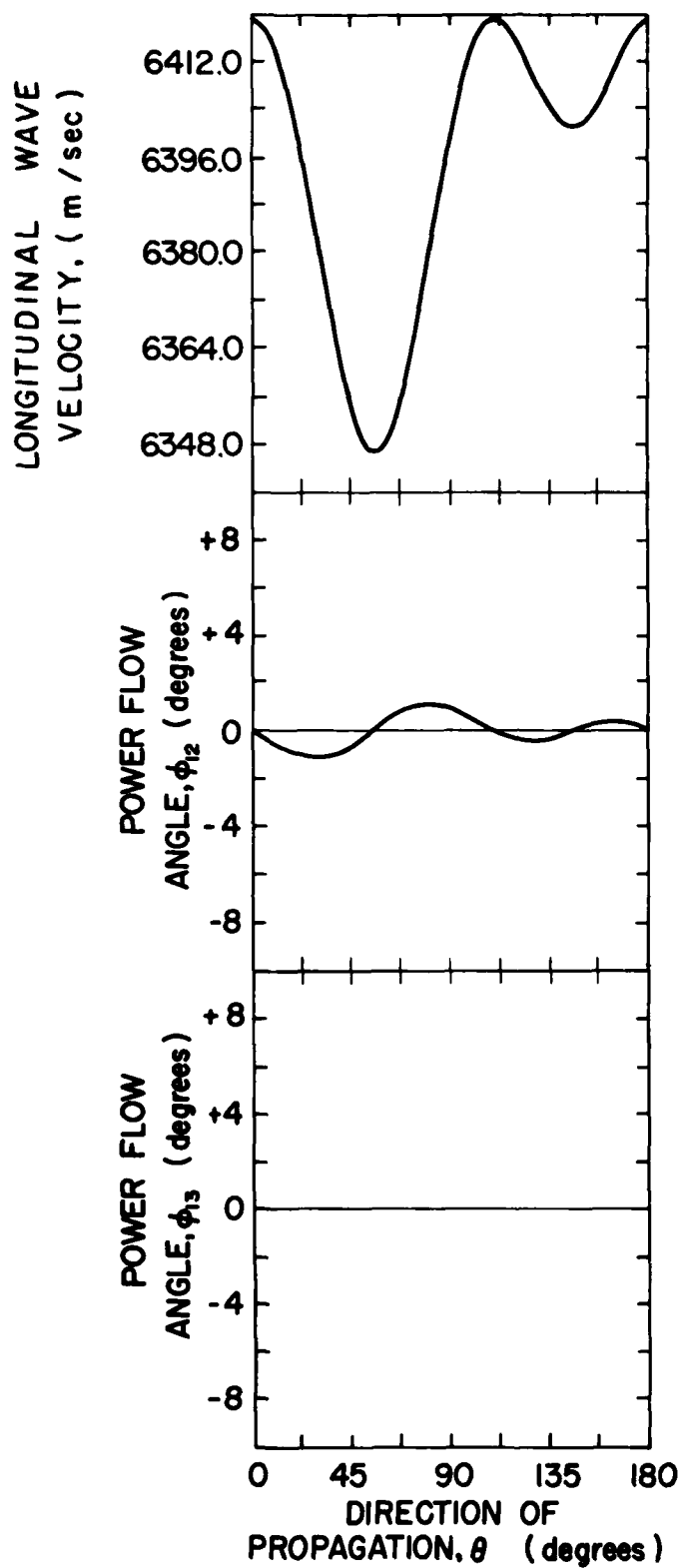


III-PLANE
GADOLINIUM GALLIUM GARNET

SECOND SHEAR WAVE
VELOCITY, (m / sec)

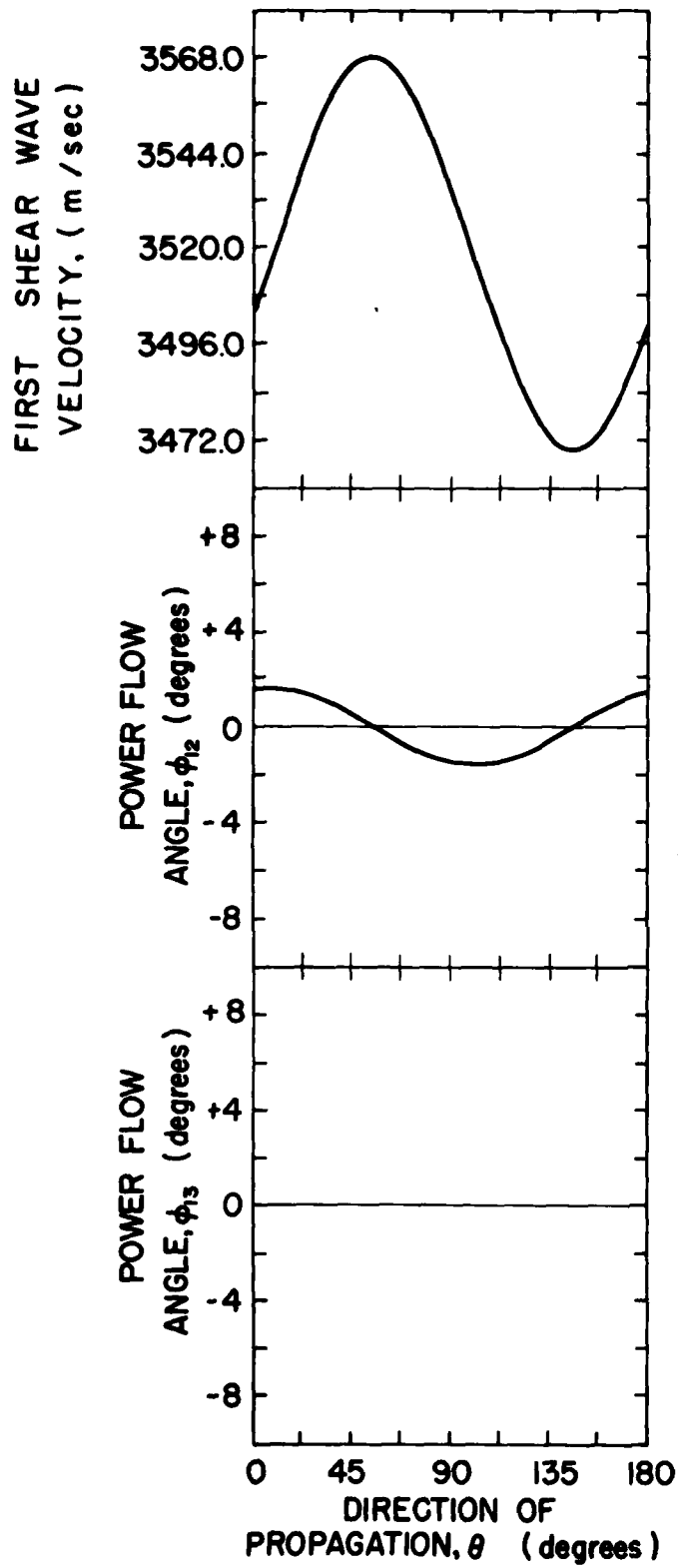


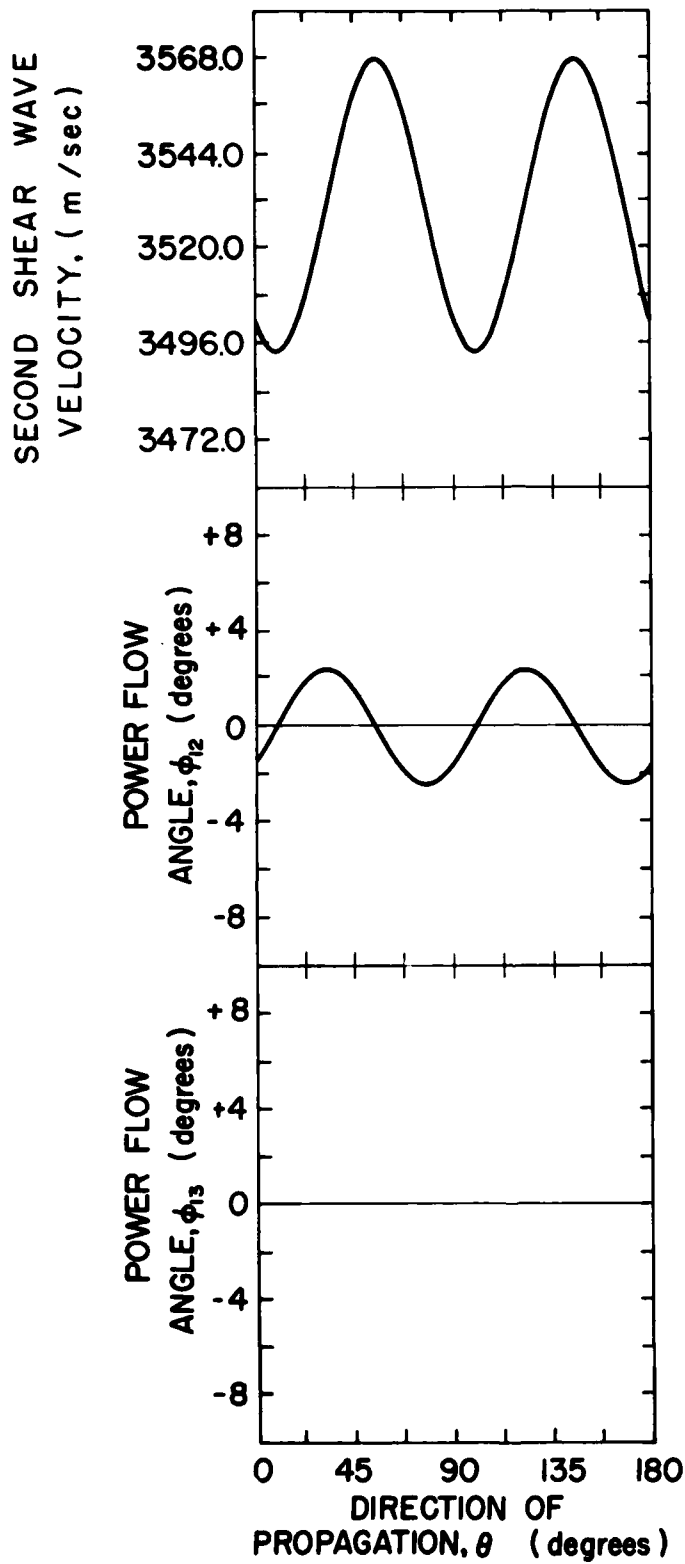
III-PLANE
GADOLINIUM GALLIUM GARNET



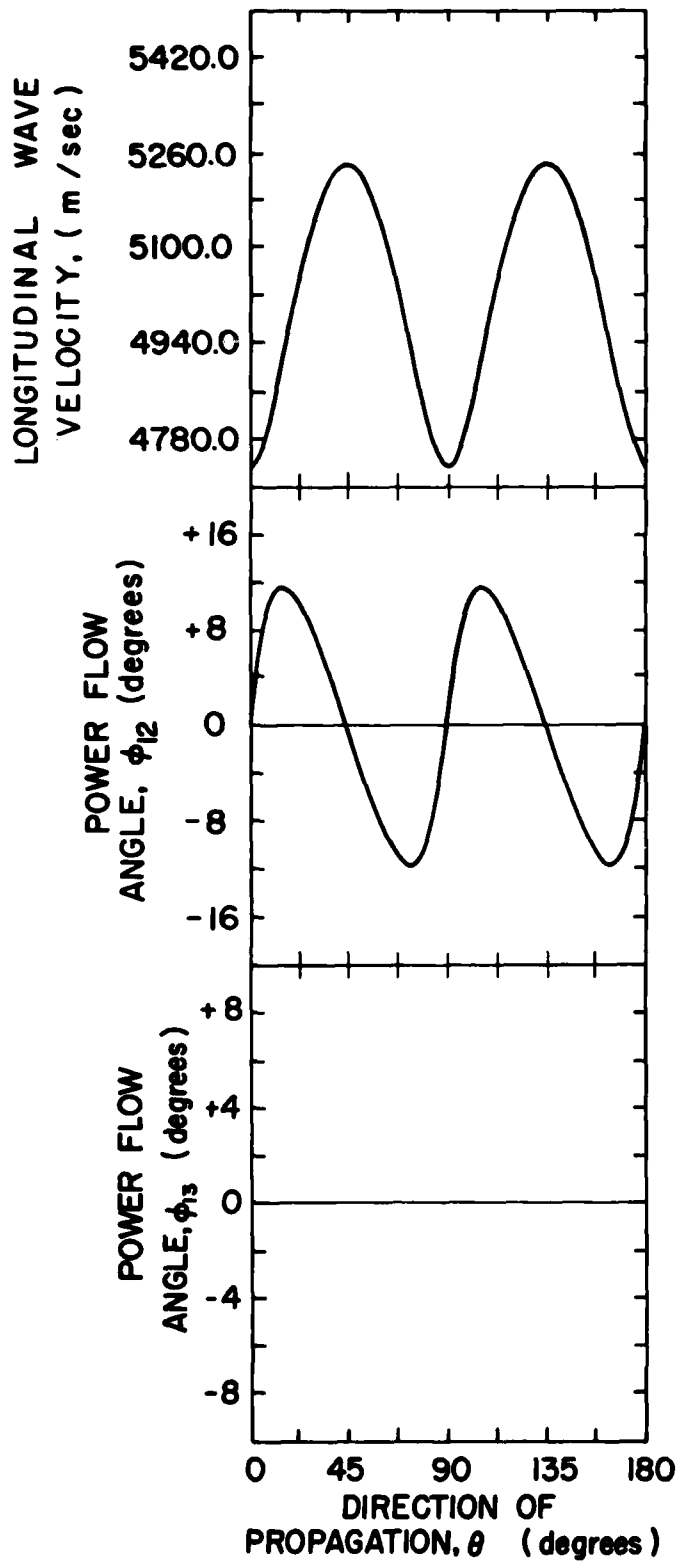
IIO-PLANE
GADOLINIUM GALLIUM GARNET

110-PLANE
GADOLINIUM GALLIUM GARNET

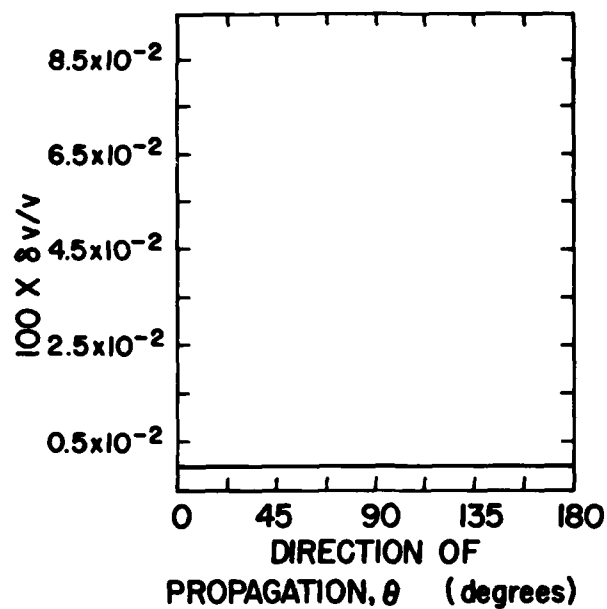


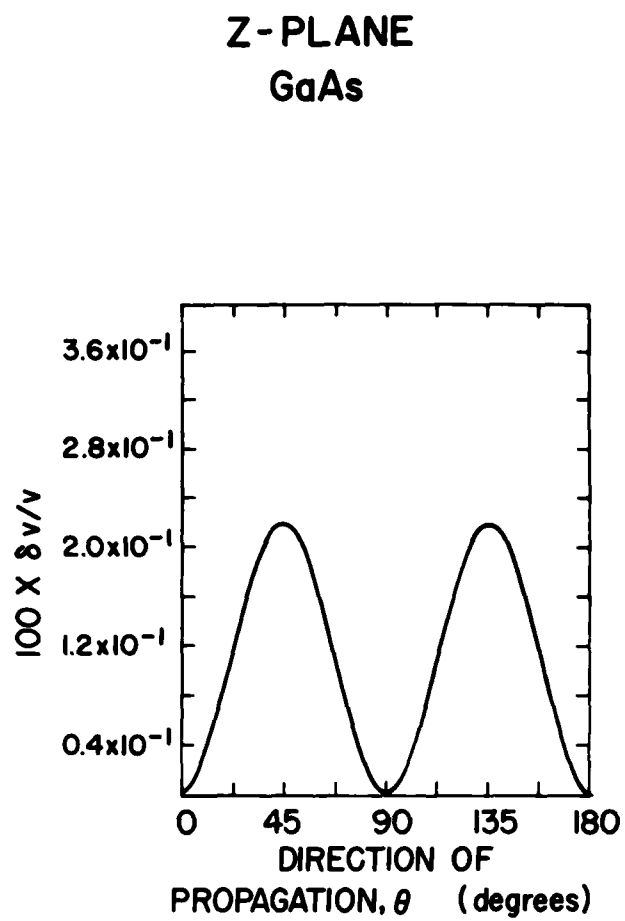
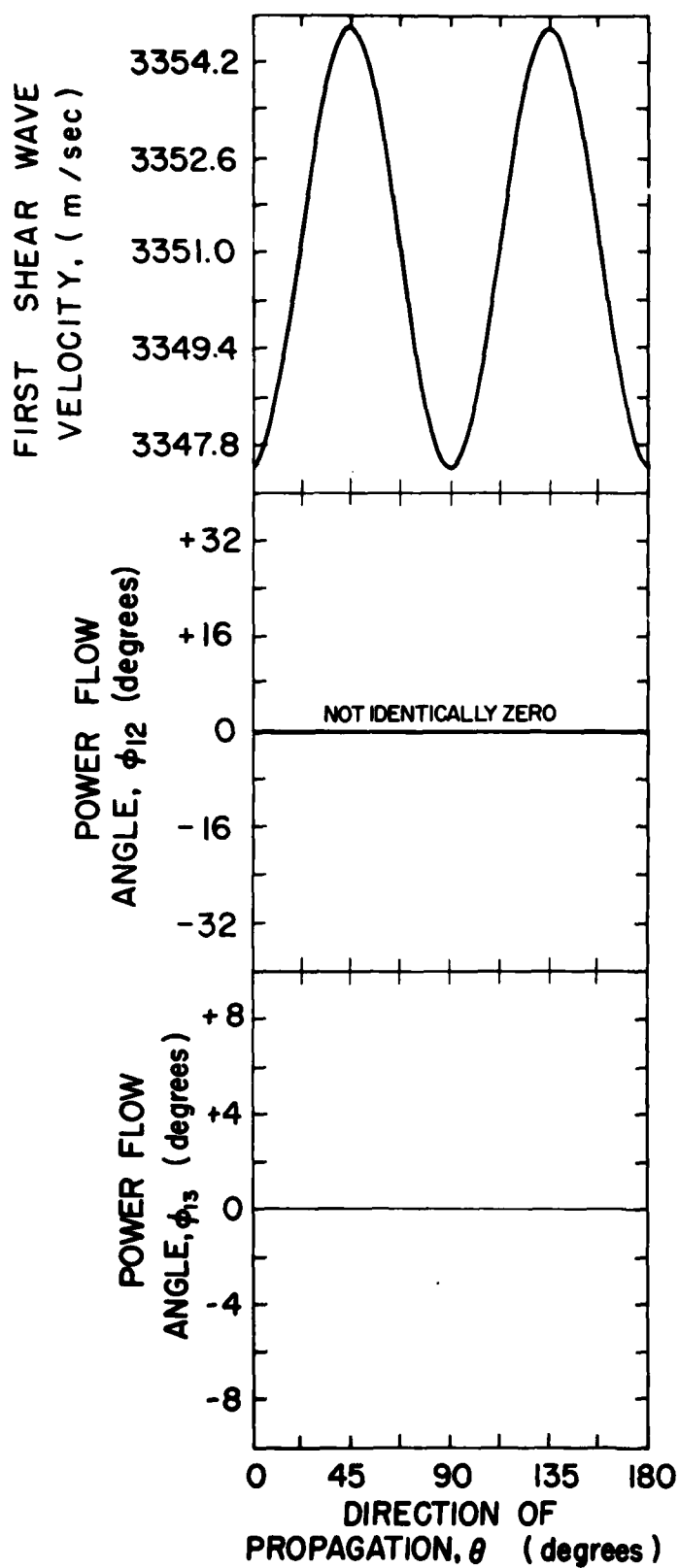


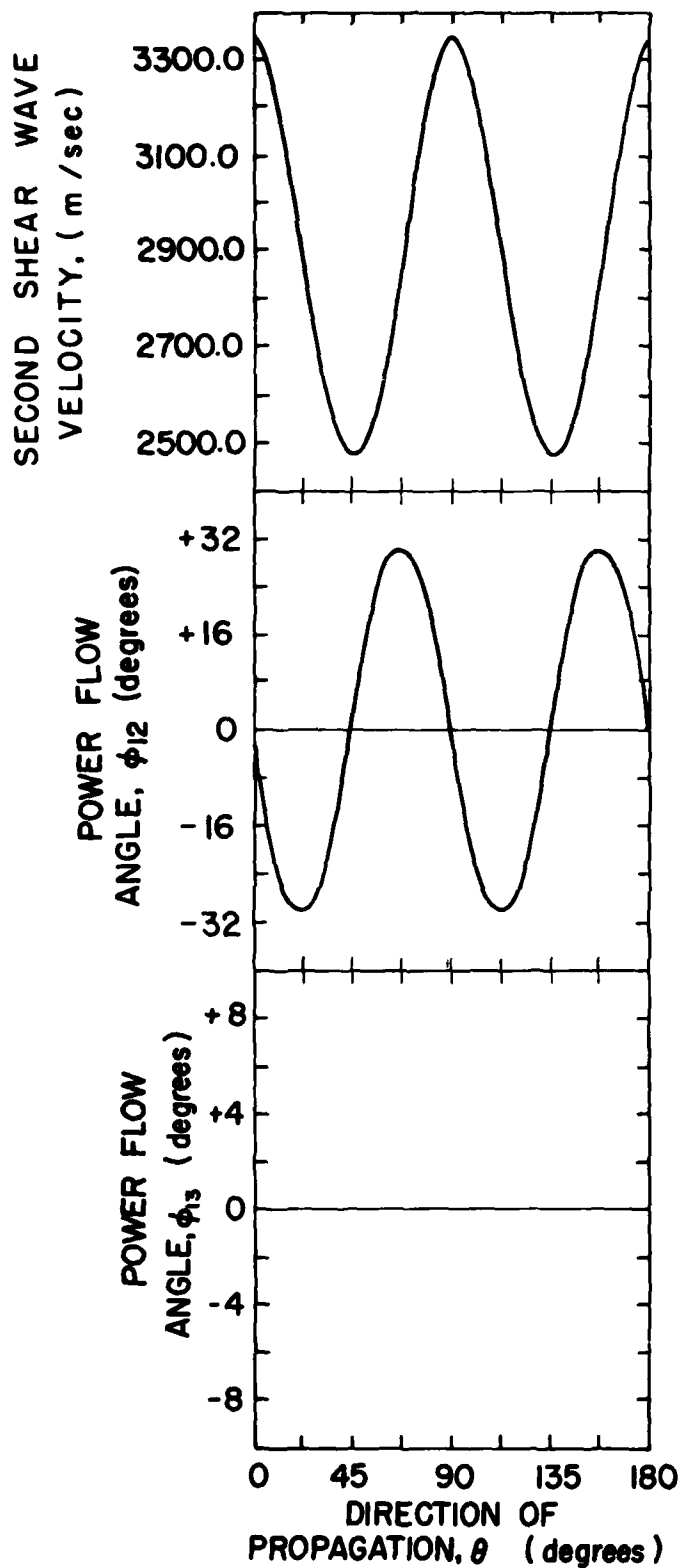
IIO-PLANE
GADOLINIUM GALLIUM GARNET



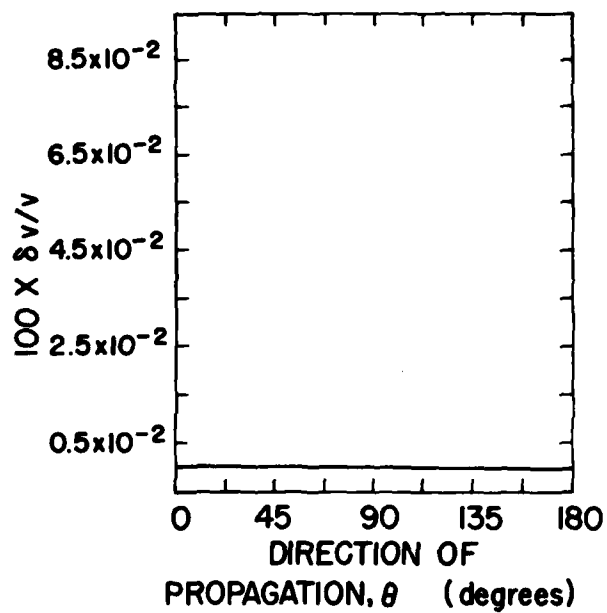
Z-PLANE
GaAs



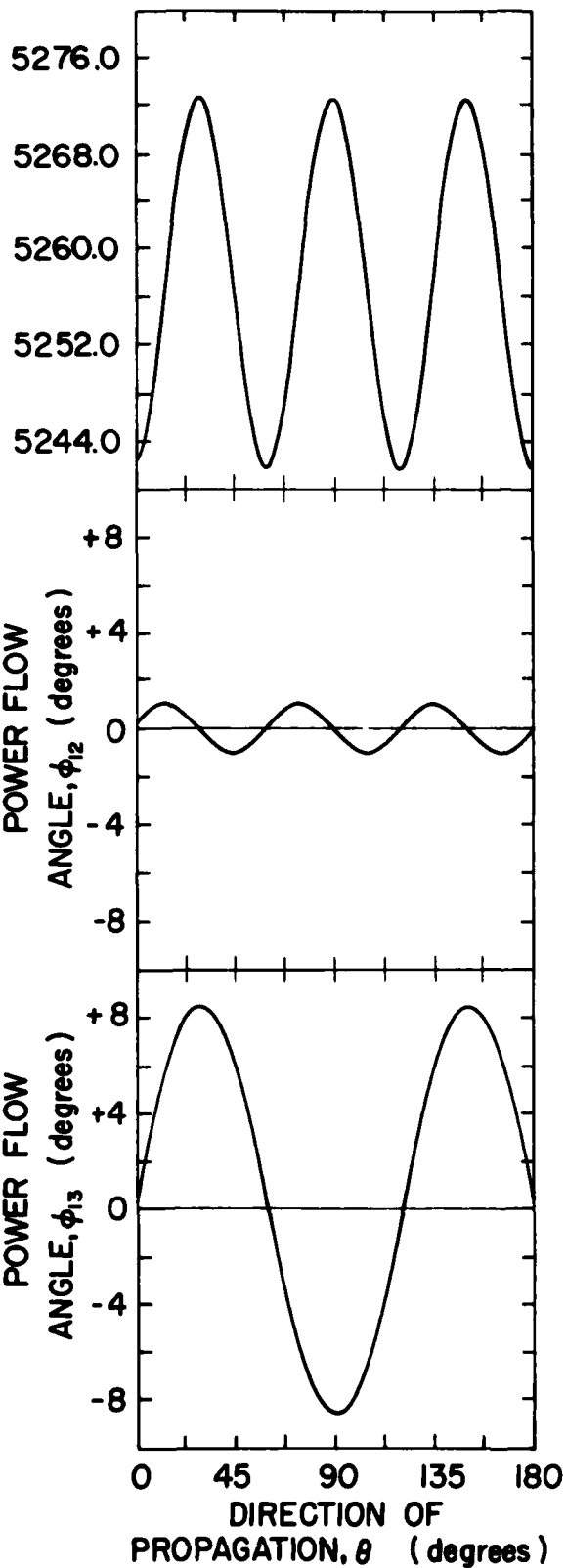




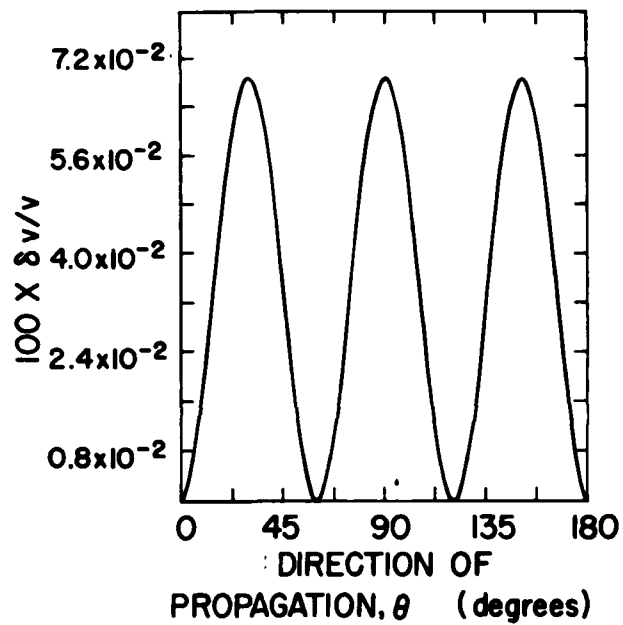
Z-PLANE
GaAs

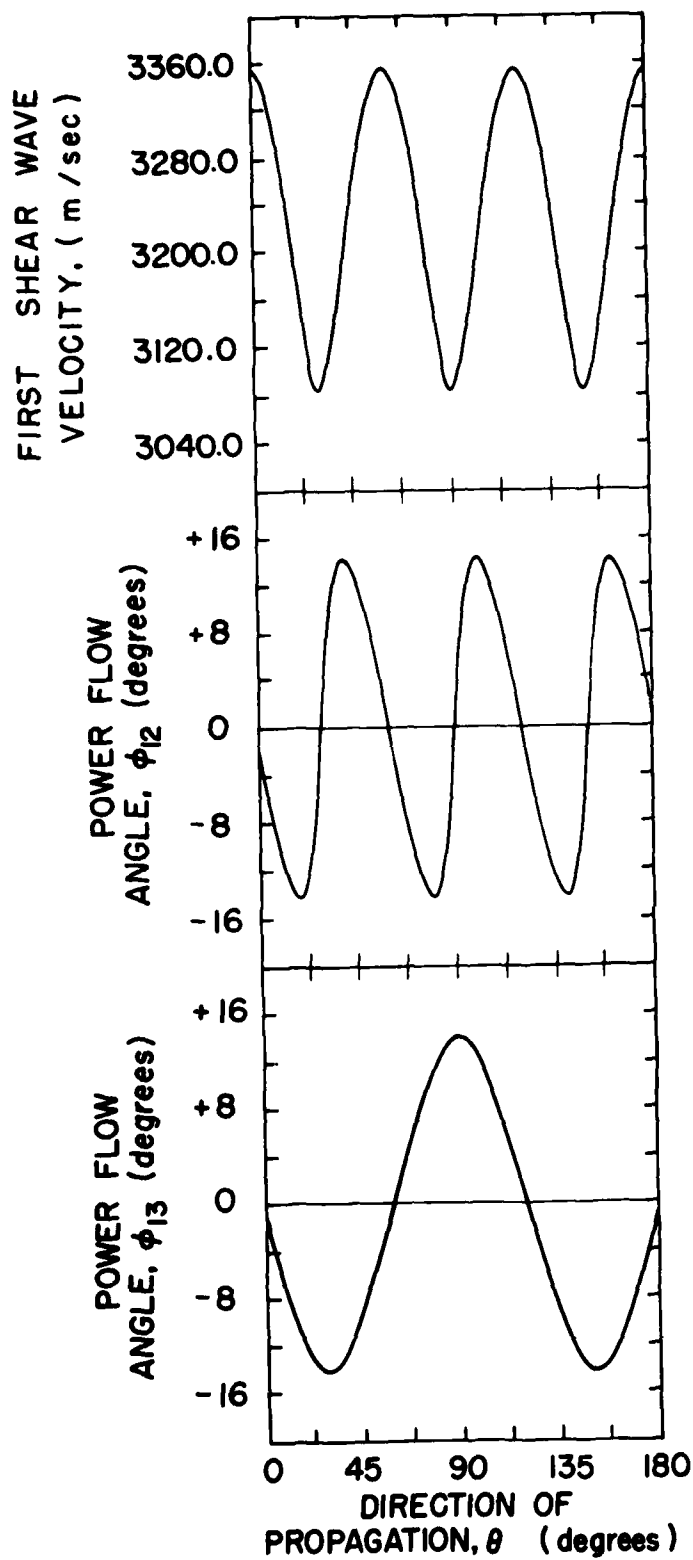


LONGITUDINAL WAVE
VELOCITY, (m / sec)

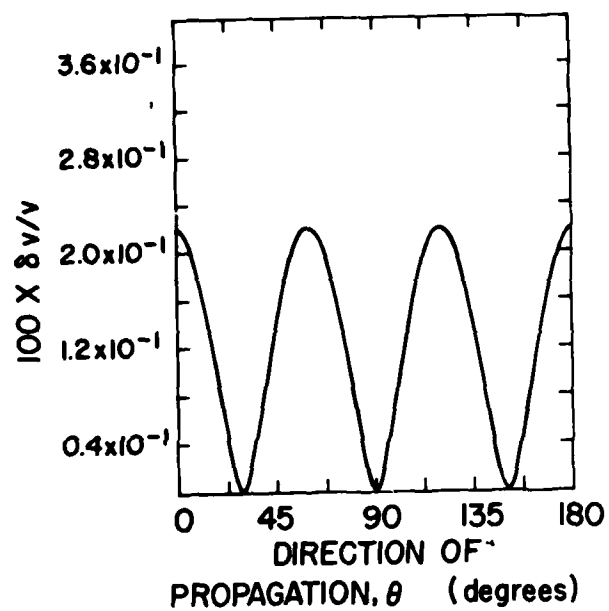


III-PLANE GaAs





III-PLANE GaAs



SECOND SHEAR WAVE
VELOCITY, (m /sec)

2760.0
2680.0
2600.0
2520.0
2440.0

POWER FLOW
ANGLE, ϕ_{12} (degrees)

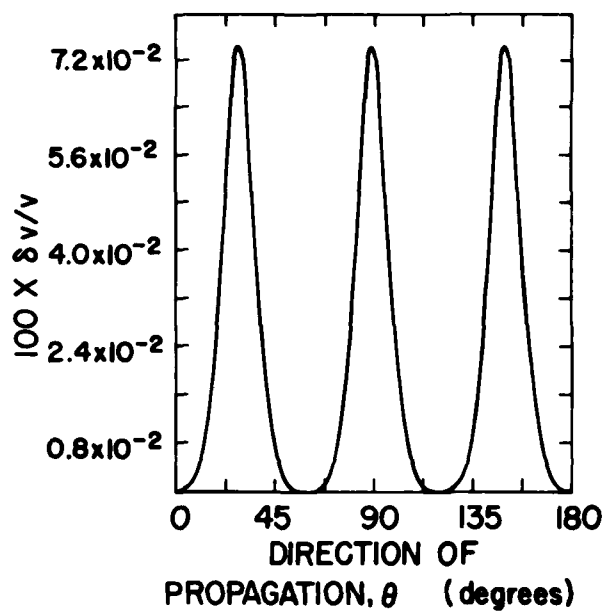
+16
+8
0
-8
-16

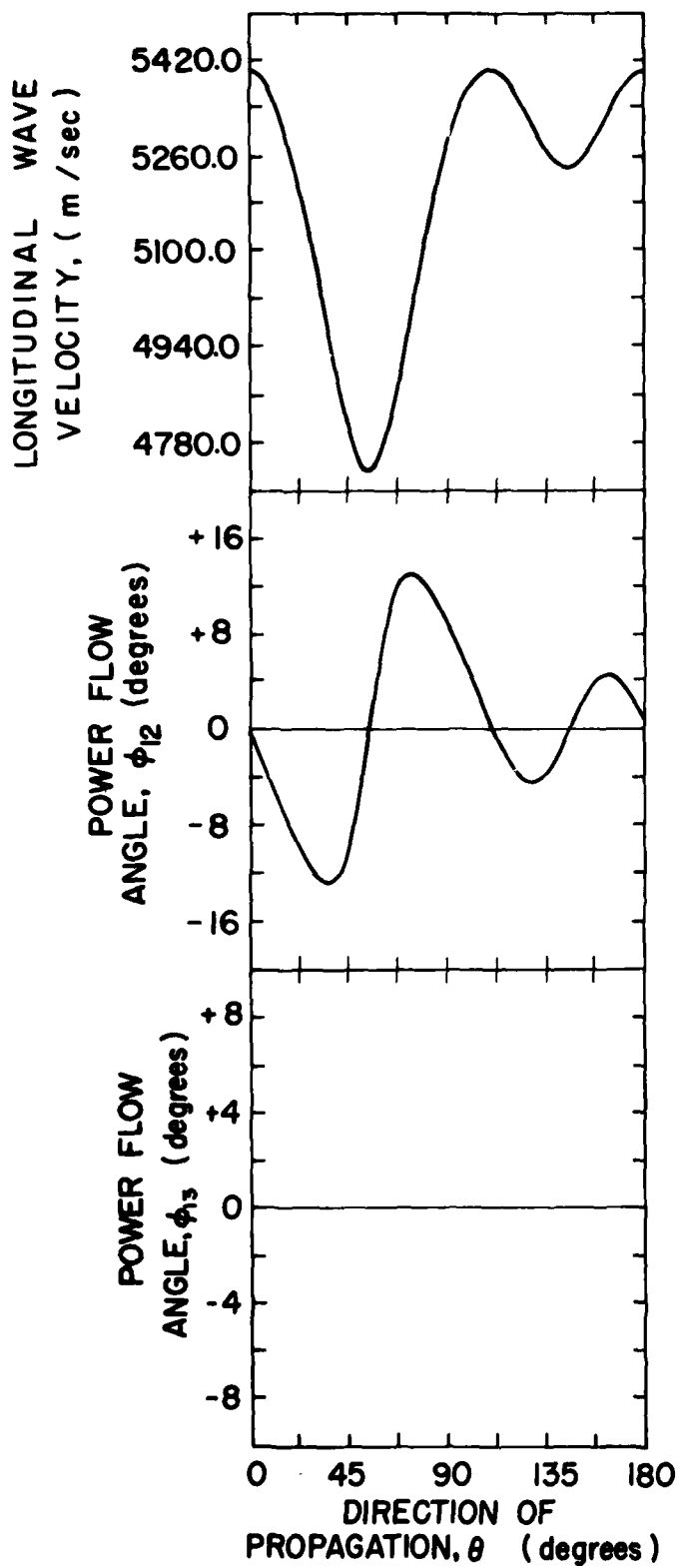
POWER FLOW
ANGLE, ϕ_{13} (degrees)

+16
+8
0
-8
-16

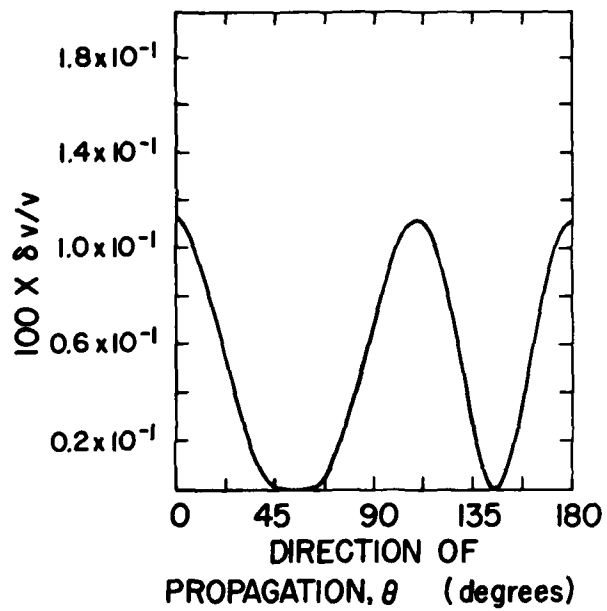
0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

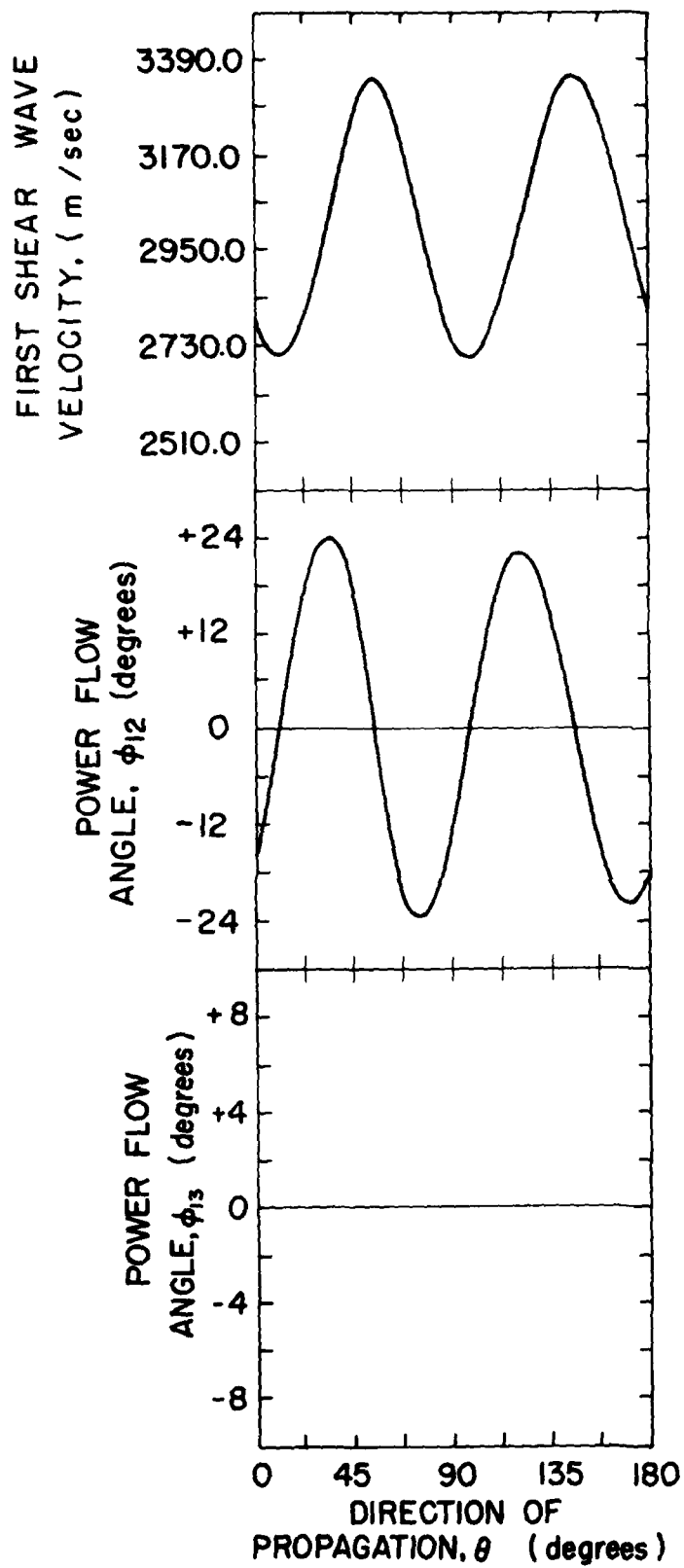
III-PLANE GaAs



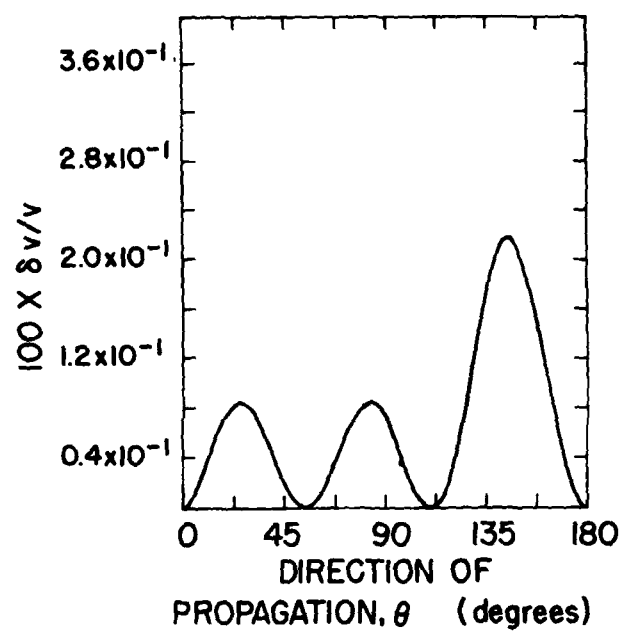


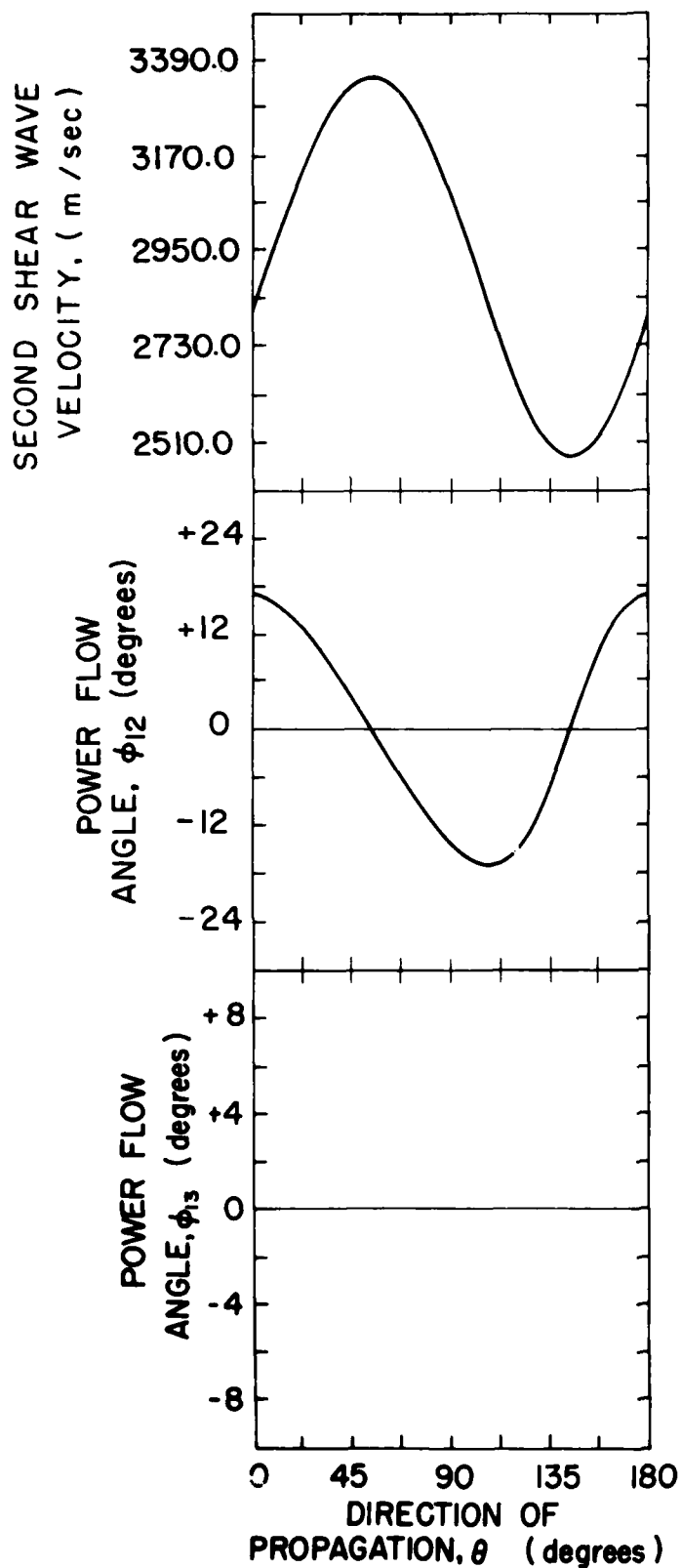
110 - PLANE
GaAs



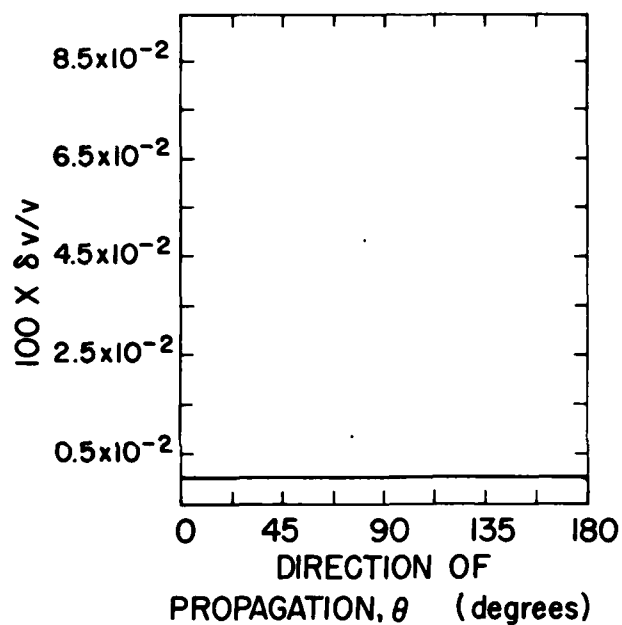


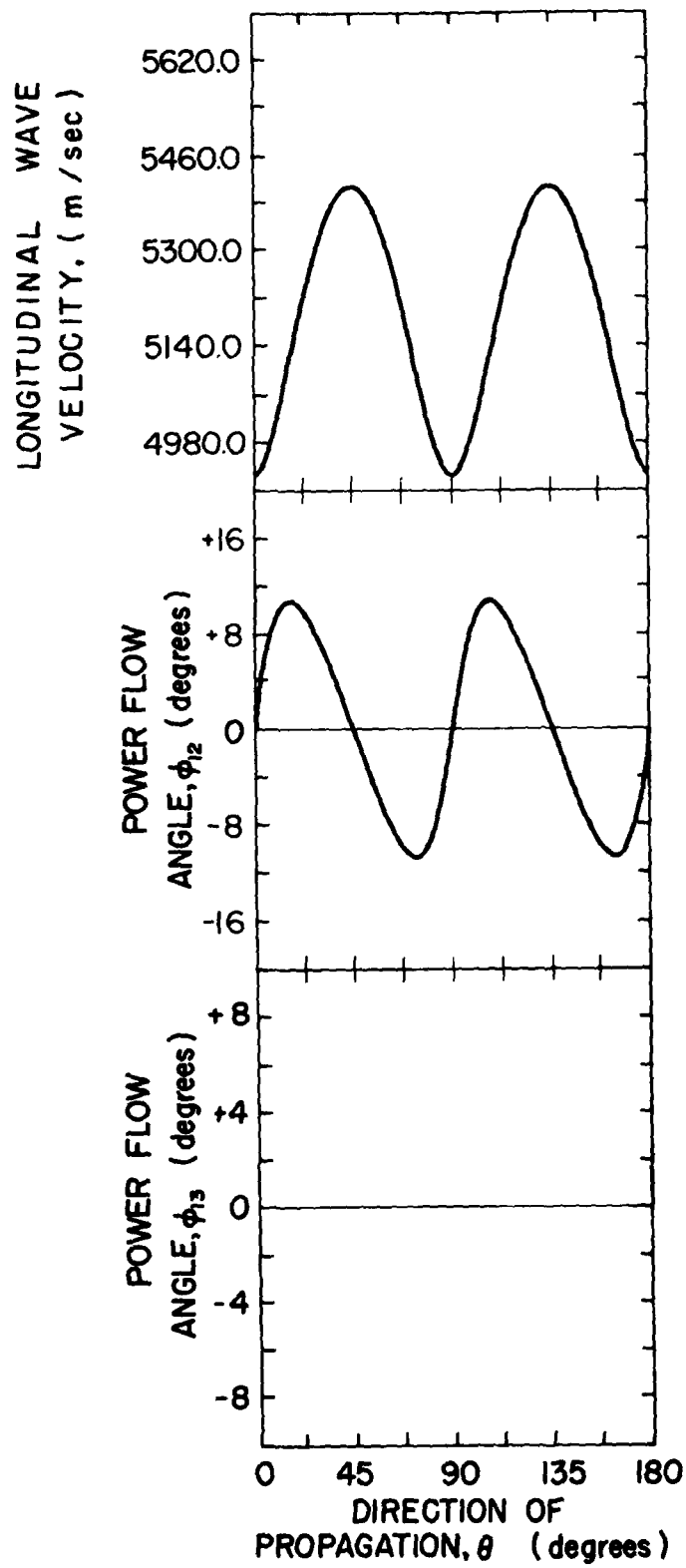
110-PLANE GaAs





110 - PLANE
GaAs





Z - PLANE
GERMANIUM

SECOND SHEAR WAVE
VELOCITY, (m / sec)

36000
34000
32000
30000
28000

POWER FLOW

ANGLE, ϕ_{12} (degrees)

+24
+12
0
-12
-24

POWER FLOW

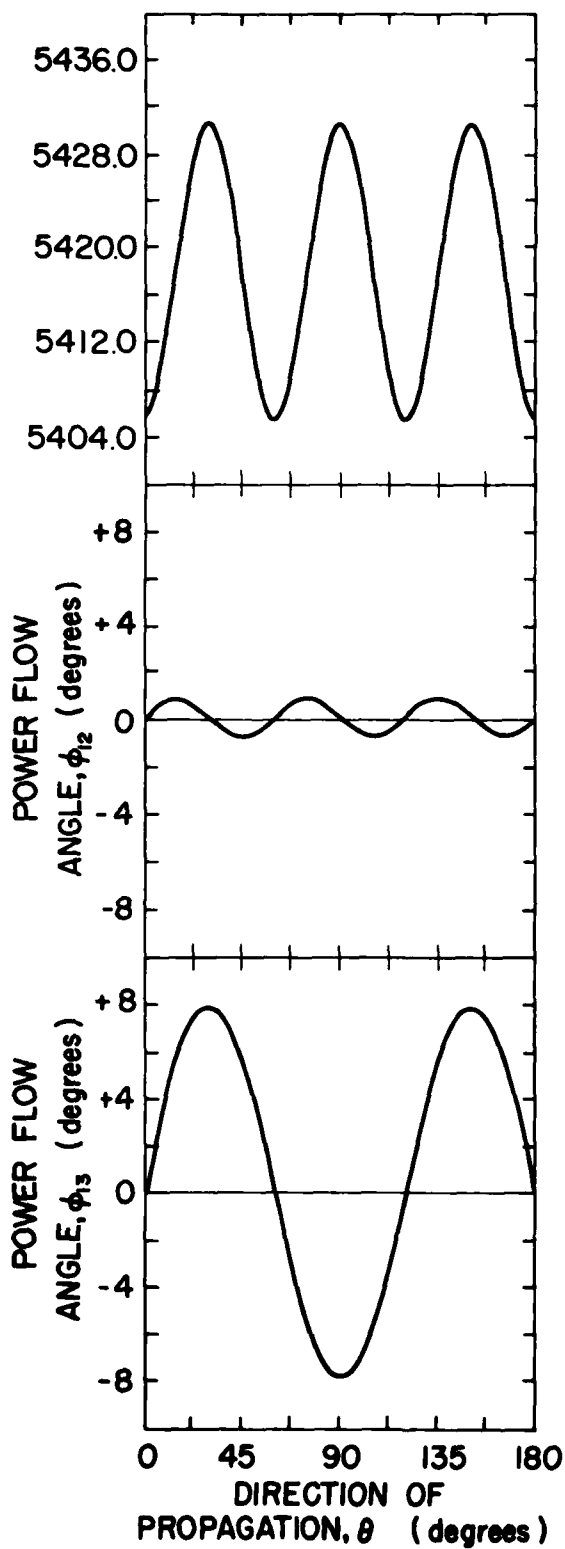
ANGLE, ϕ_{13} (degrees)

+8
+4
0
-4
-8

0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

Z-PLANE
GERMANIUM

LONGITUDINAL WAVE
VELOCITY, (m / sec)



III-PLANE
GERMANIUM

FIRST SHEAR WAVE
VELOCITY, (m / sec)

3660.0
3580.0
3500.0
3420.0
3340.0

POWER FLOW
ANGLE, ϕ_{12} (degrees)

+16
+8
0
-8
-16

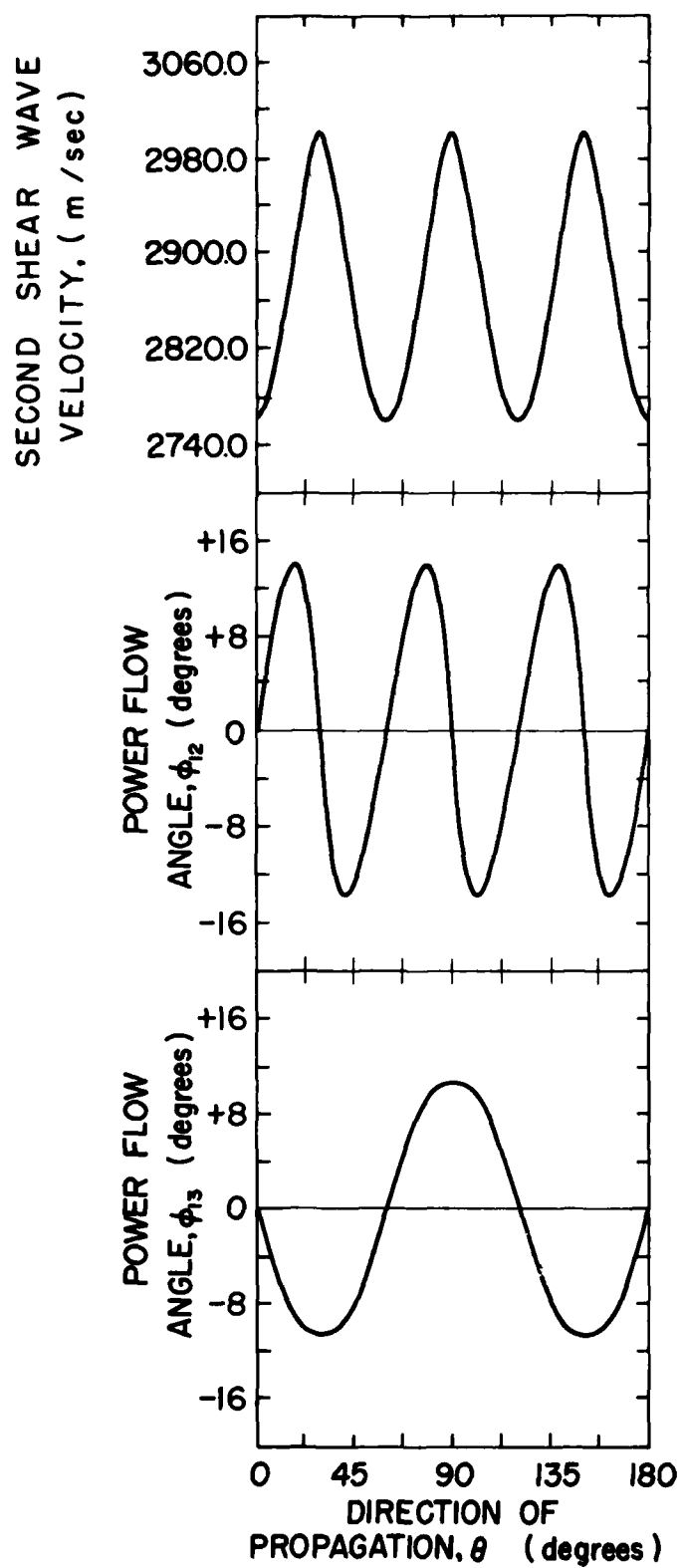
POWER FLOW
ANGLE, ϕ_{13} (degrees)

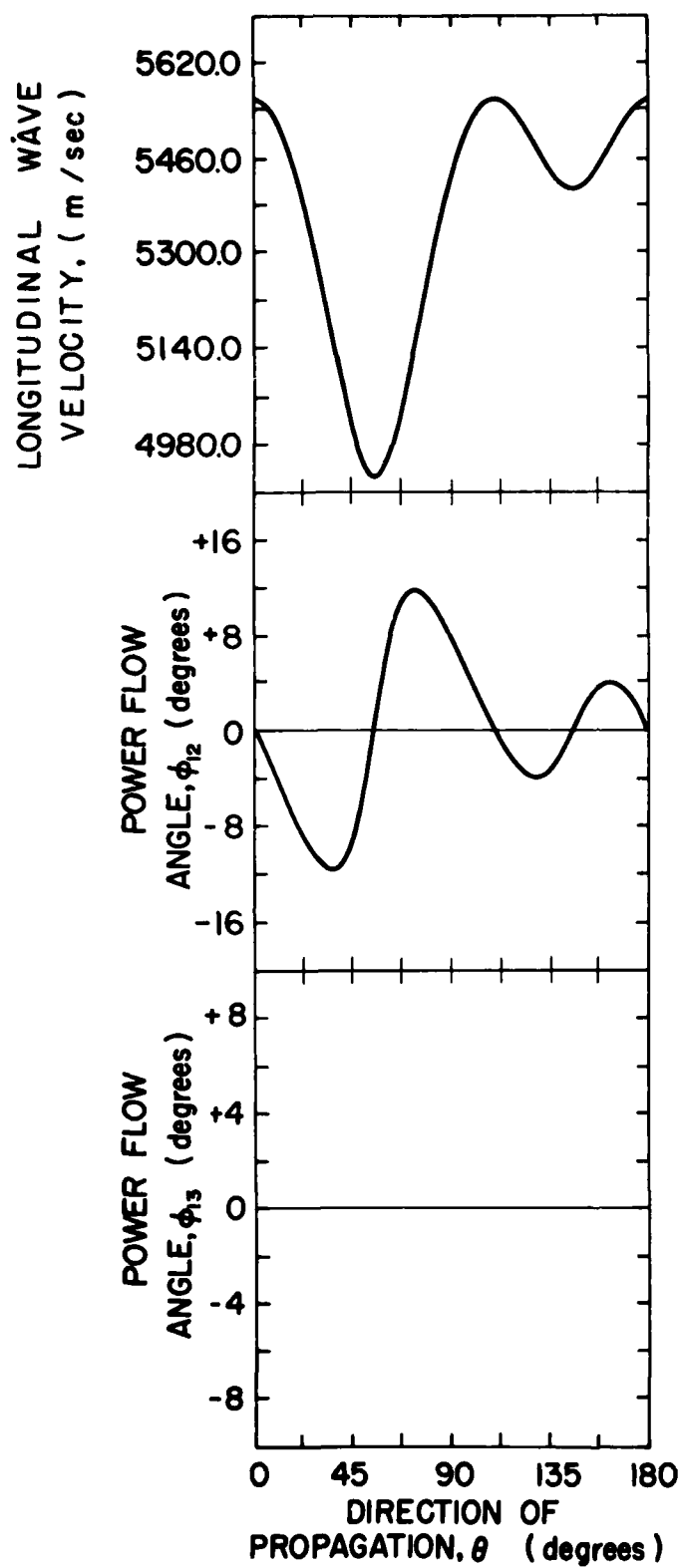
+16
+8
0
-8
-16

0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

III - PLANE
GERMANIUM

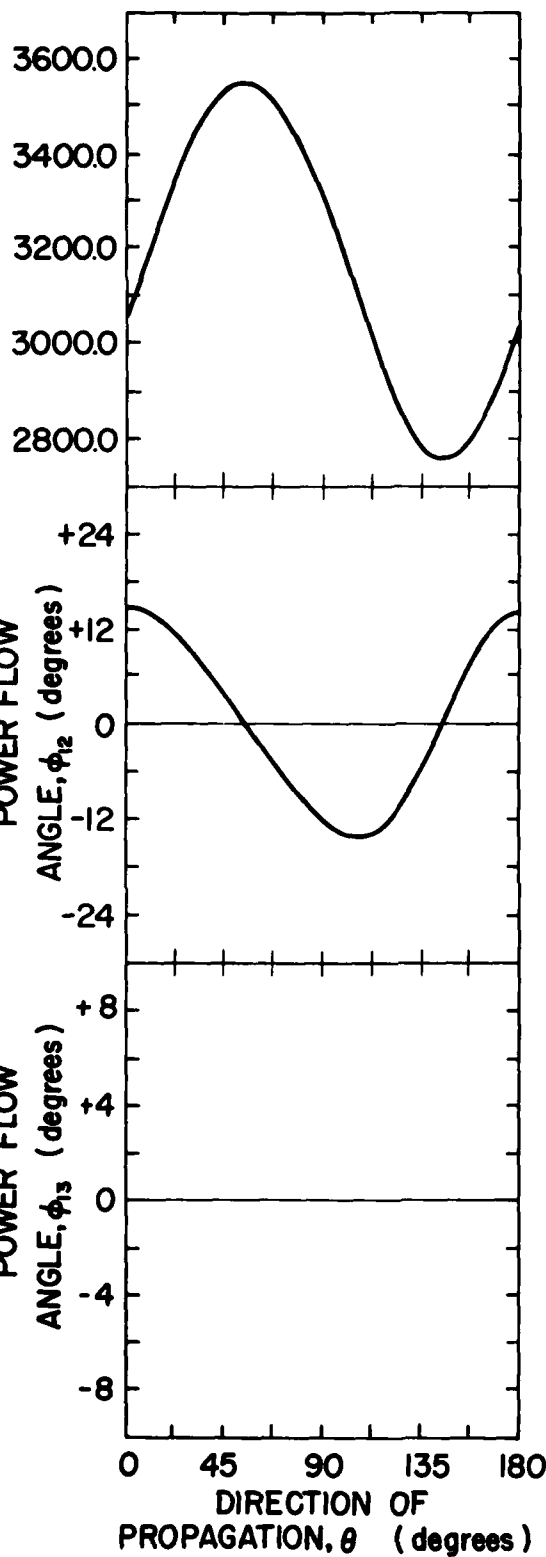
III-PLANE GERMANIUM





110-PLANE
GERMANIUM

FIRST SHEAR WAVE
VELOCITY, (m / sec)



110-PLANE
GERMANIUM

SECOND SHEAR WAVE
VELOCITY, (m / sec)

3600.0
3400.0
3200.0
3000.0
2800.0

110-PLANE
GERMANIUM

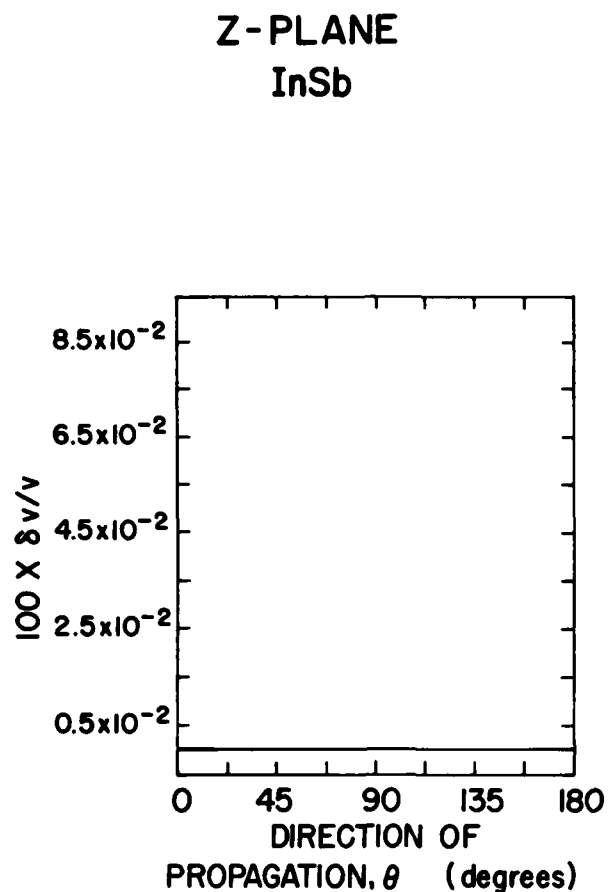
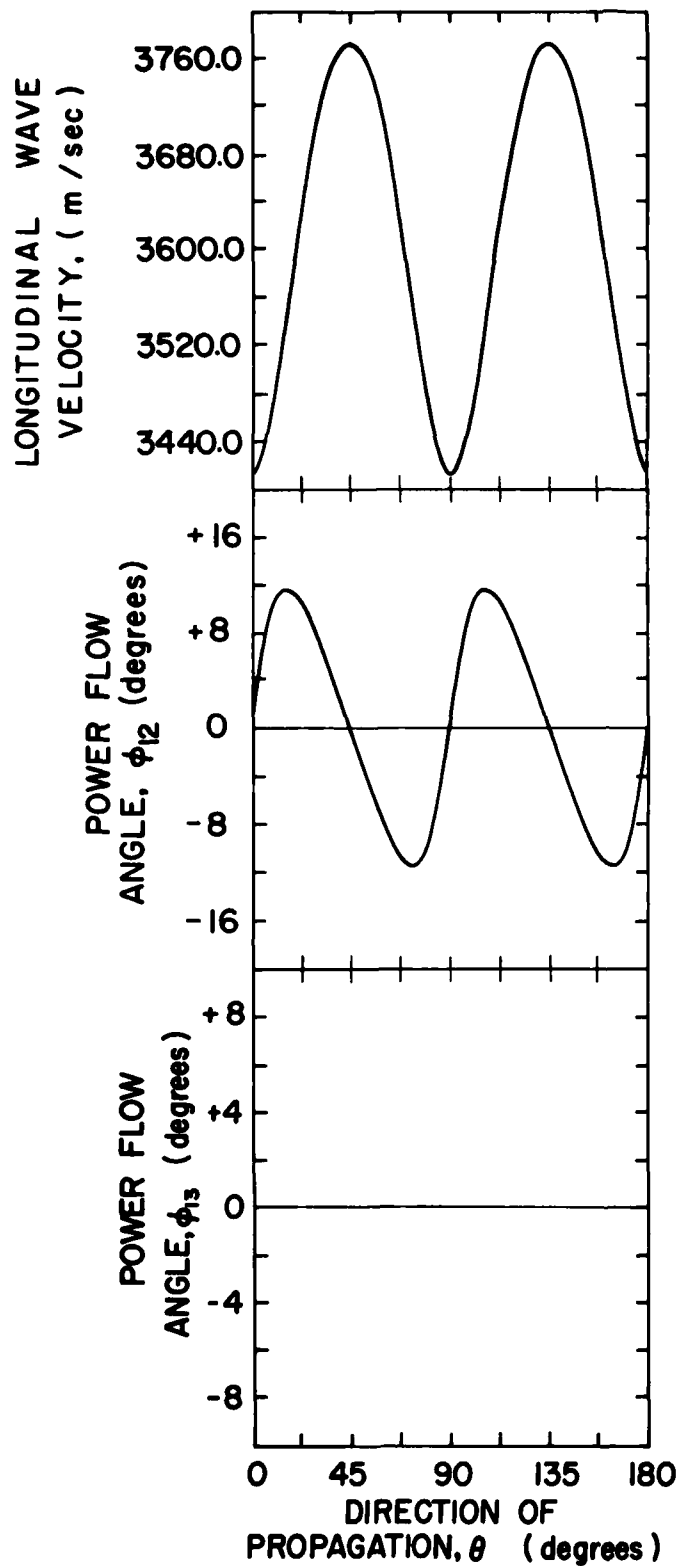
POWER FLOW
ANGLE, ϕ_{12} (degrees)

+24
+12
0
-12
-24

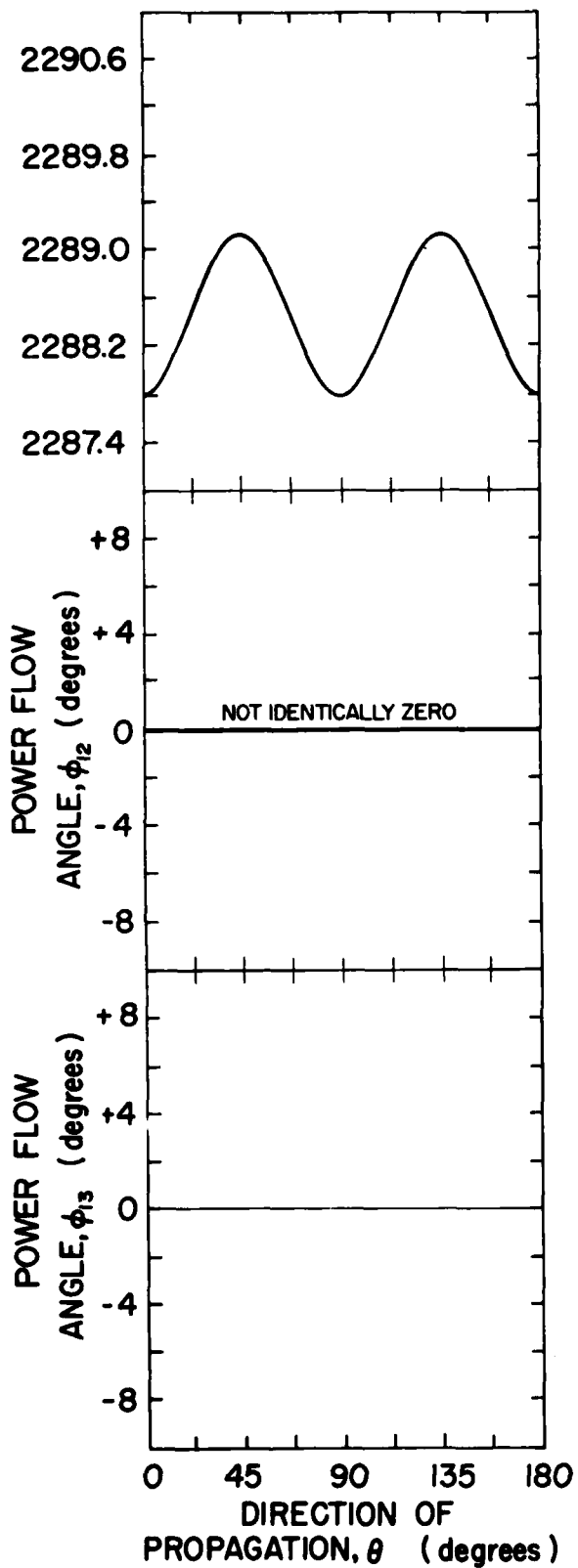
POWER FLOW
ANGLE, ϕ_{13} (degrees)

+8
+4
0
-4
-8

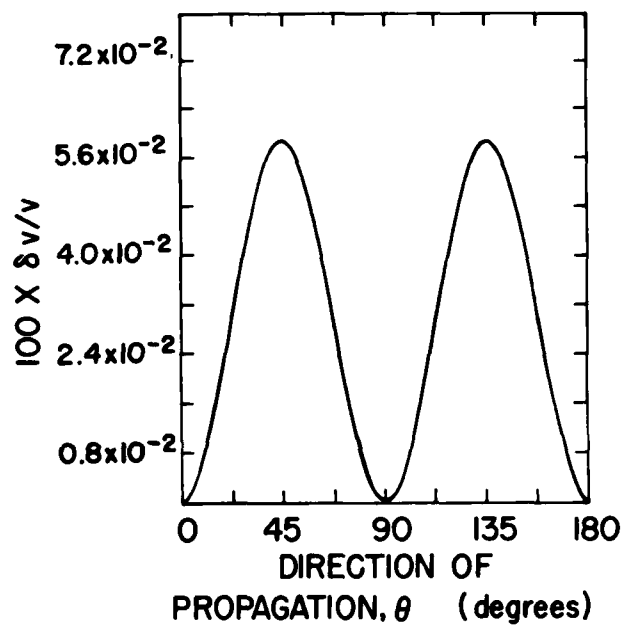
0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

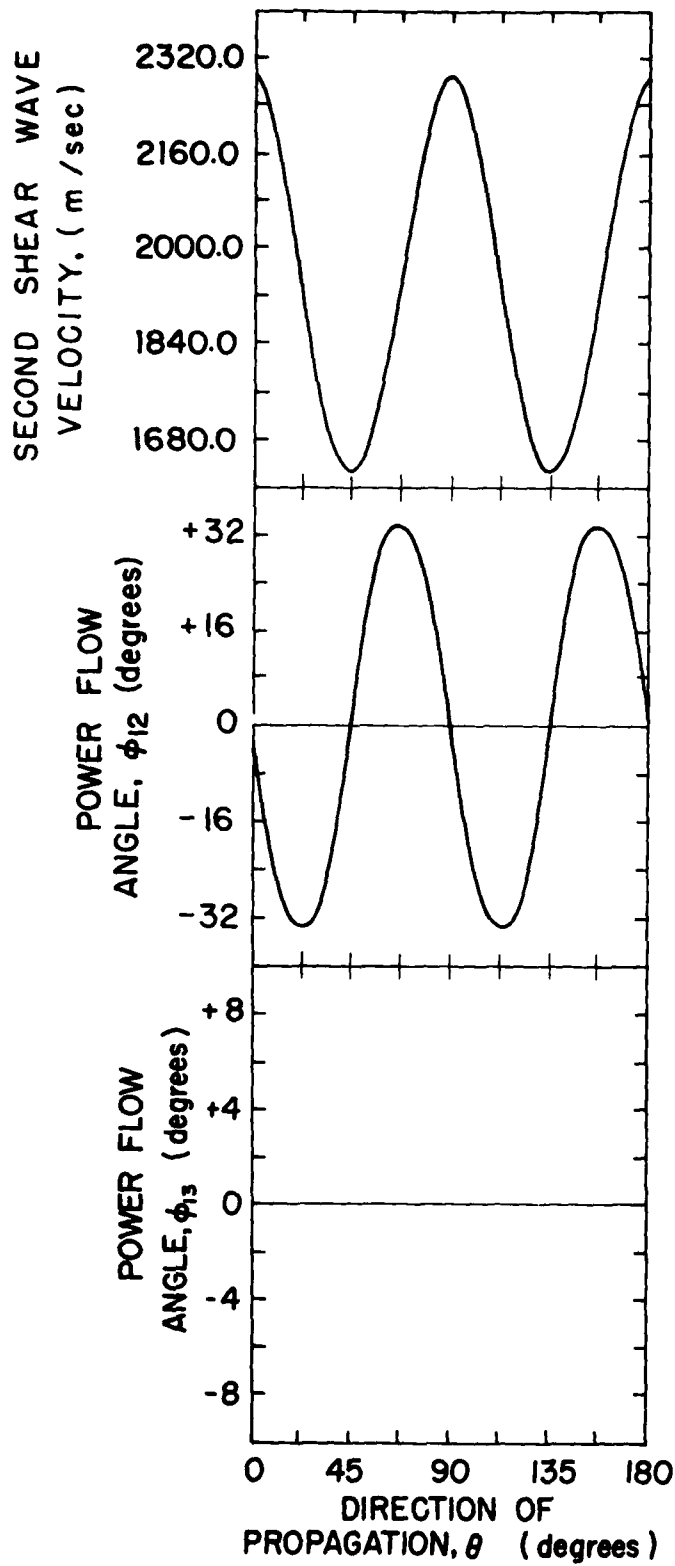


FIRST SHEAR WAVE
VELOCITY, (m/sec)

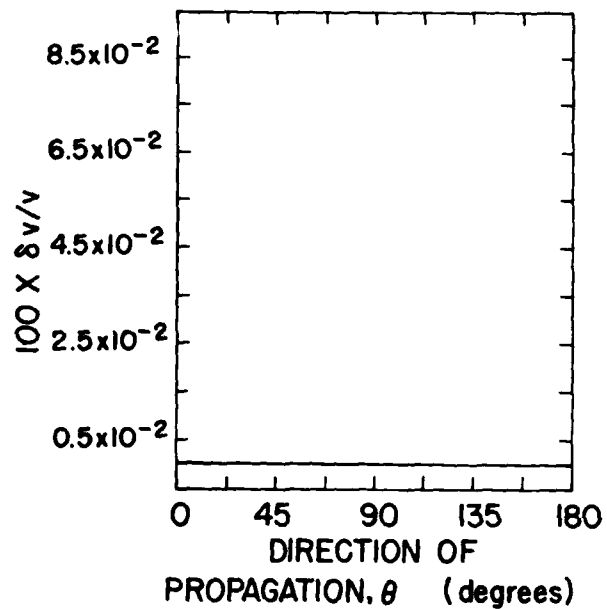


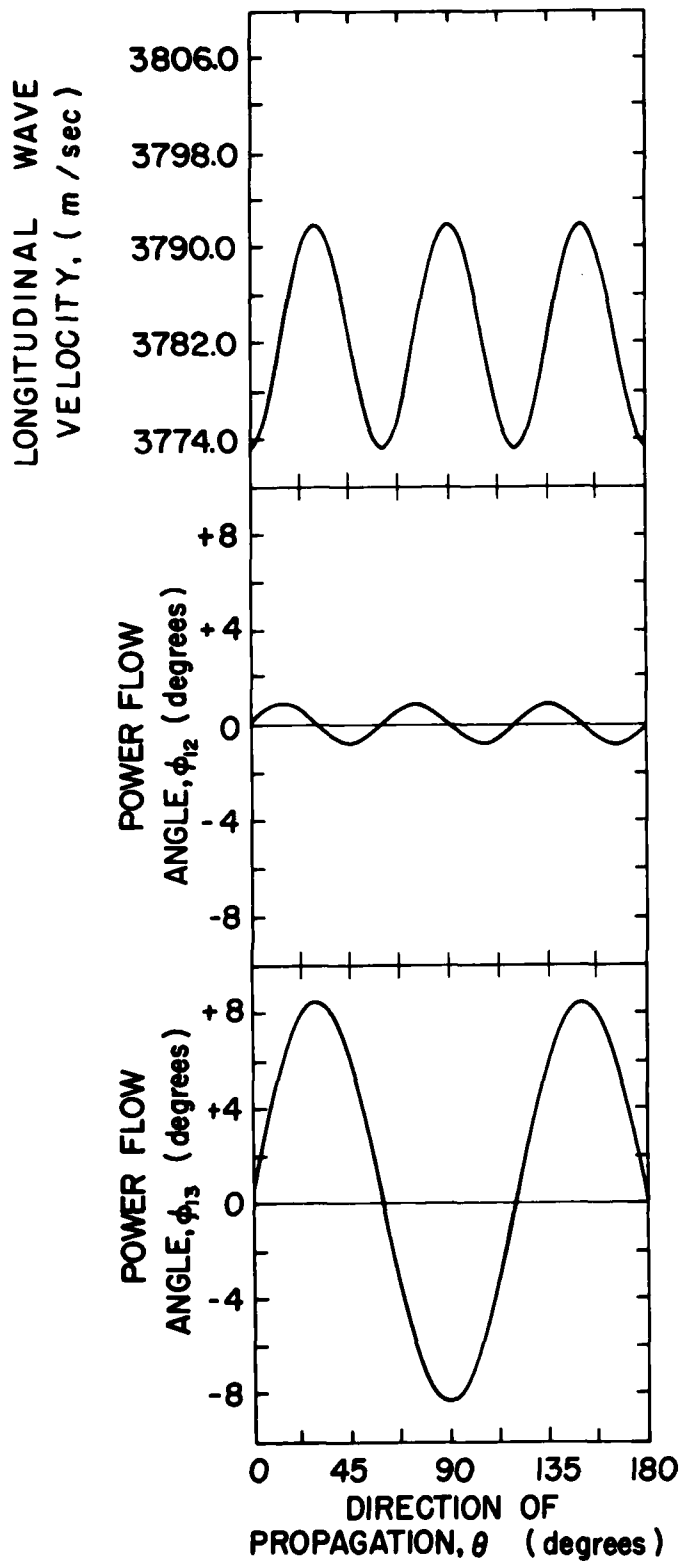
Z - PLANE
InSb



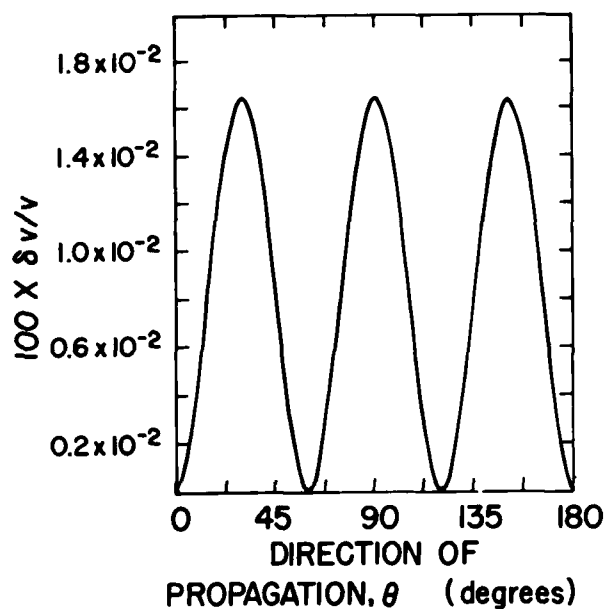


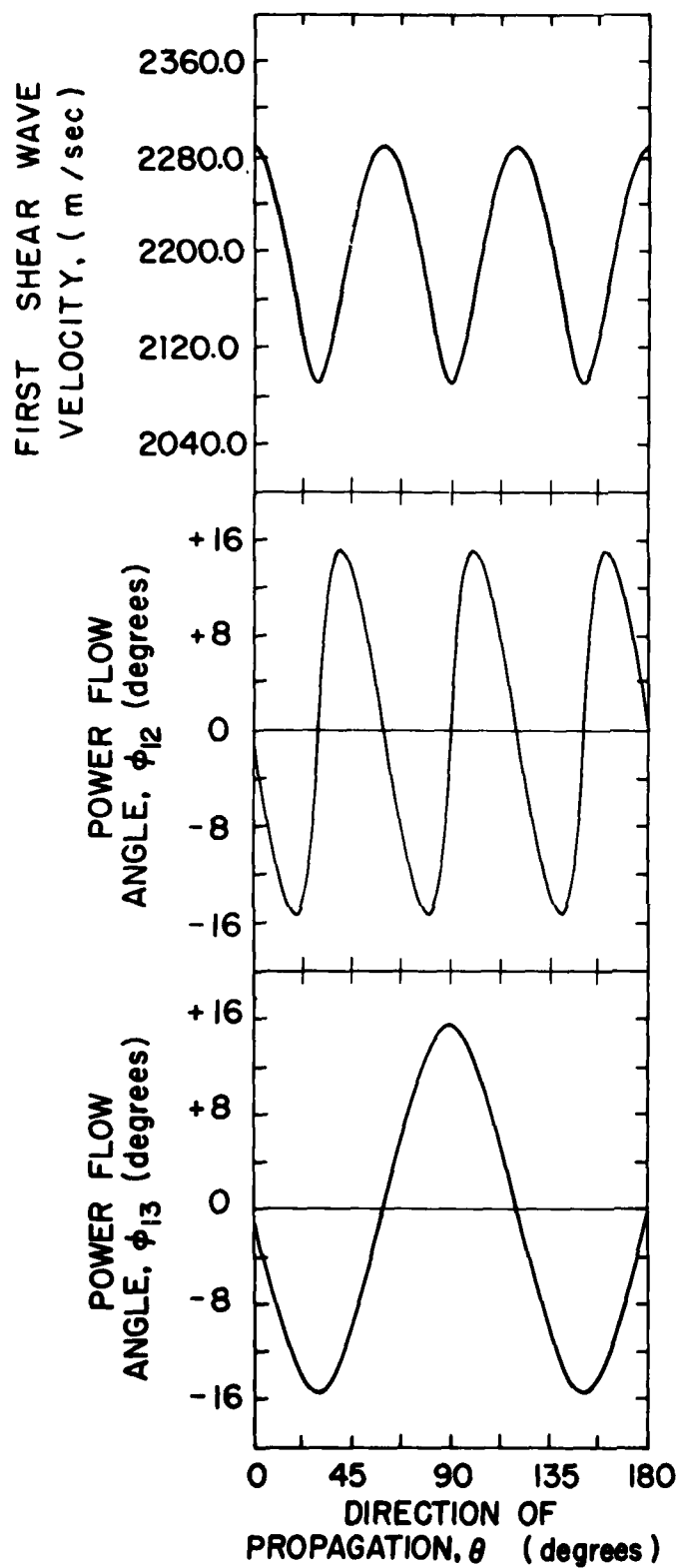
Z-PLANE
InSb



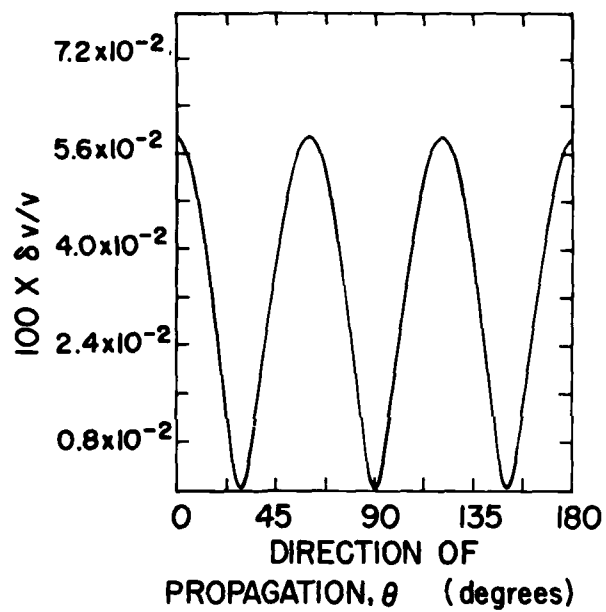


III-PLANE InSb

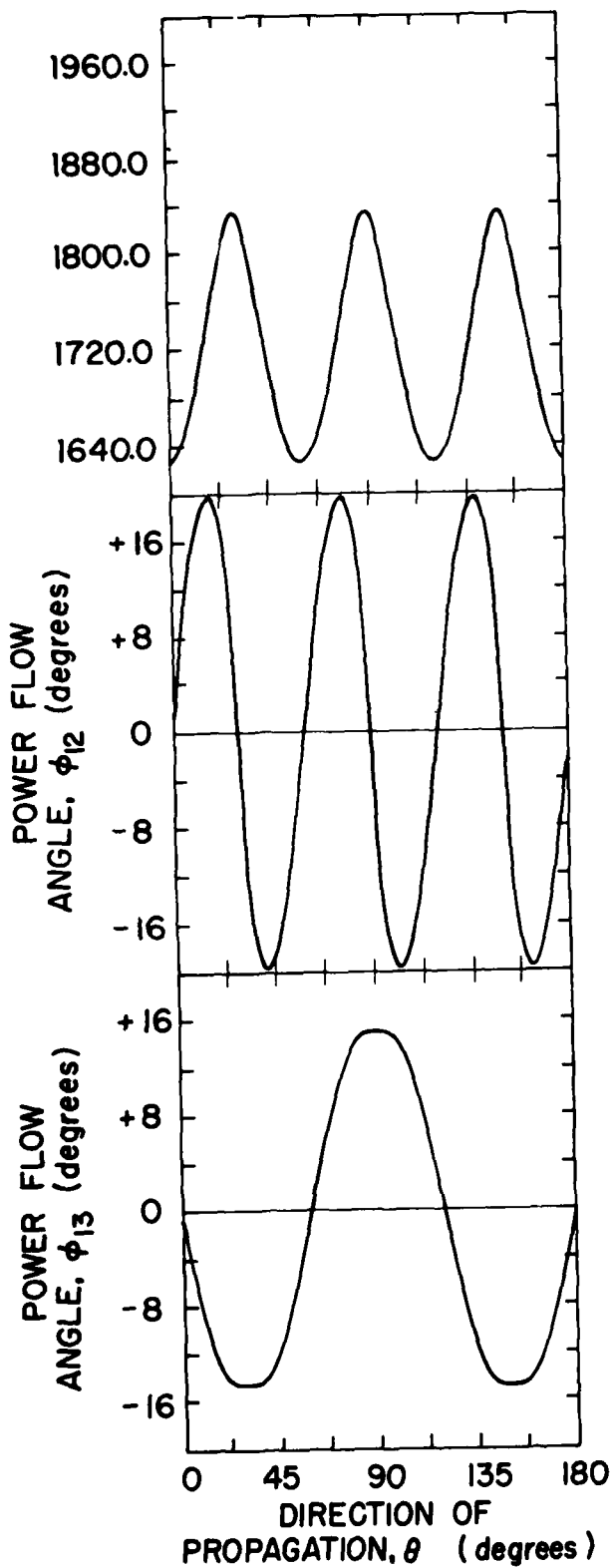




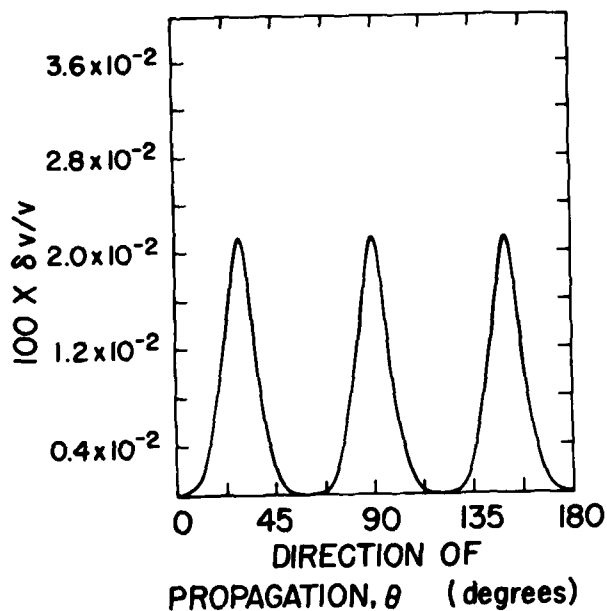
III-PLANE InSb



SECOND SHEAR WAVE
VELOCITY, (m/sec)



III-PLANE InSb



AD-A090 947

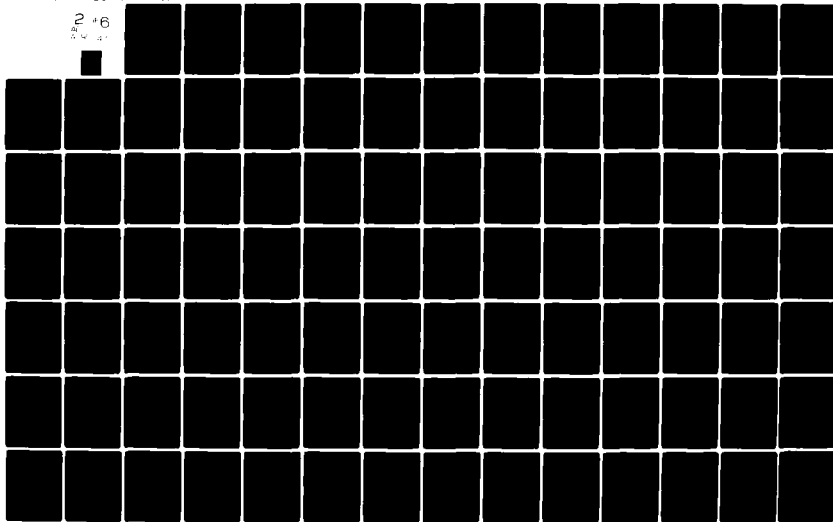
ROME AIR DEVELOPMENT CENTER GRIFFISS AFB NY F/G 20/1
MICROWAVE ACOUSTICS HANDBOOK. VOLUME 3. BULK WAVE VELOCITIES.(U)
MAY 80 A J SLOBODNIK, R T DELMONICO

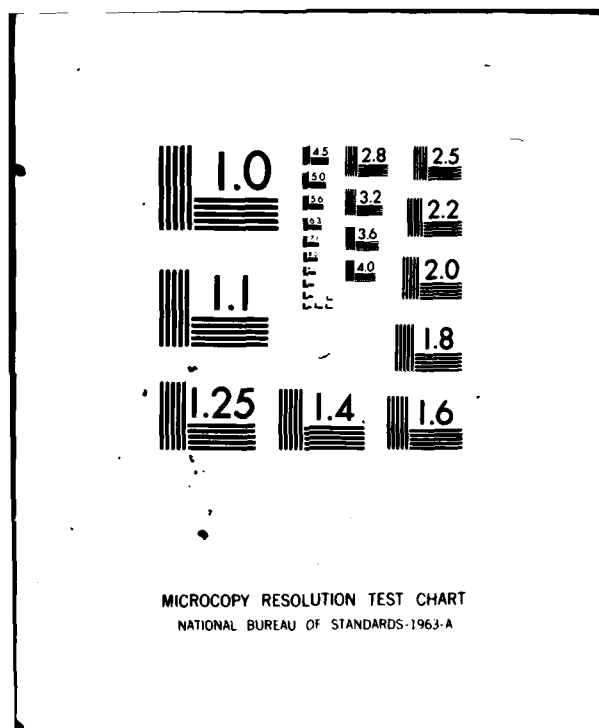
UNCLASSIFIED

RADC-TR-80-188-VOL-3

NL

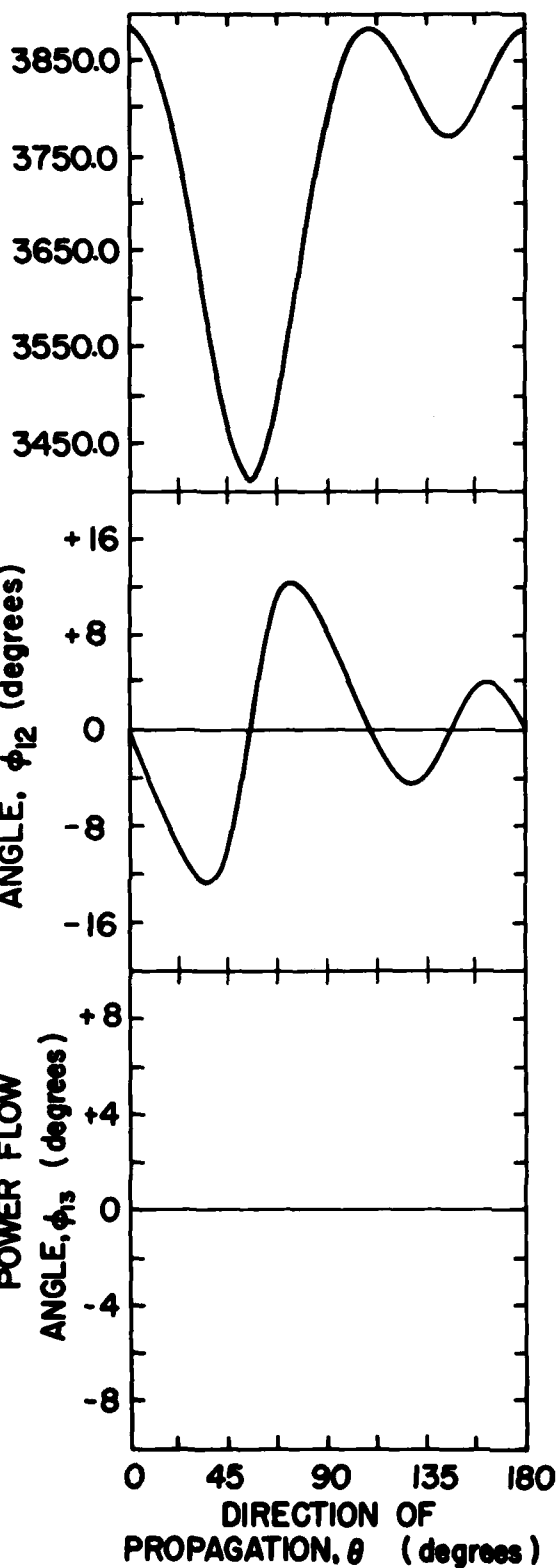
2 +6
A W 24



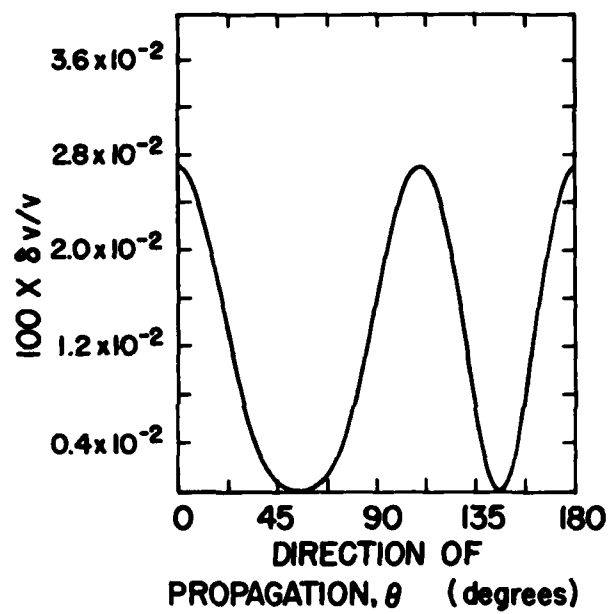


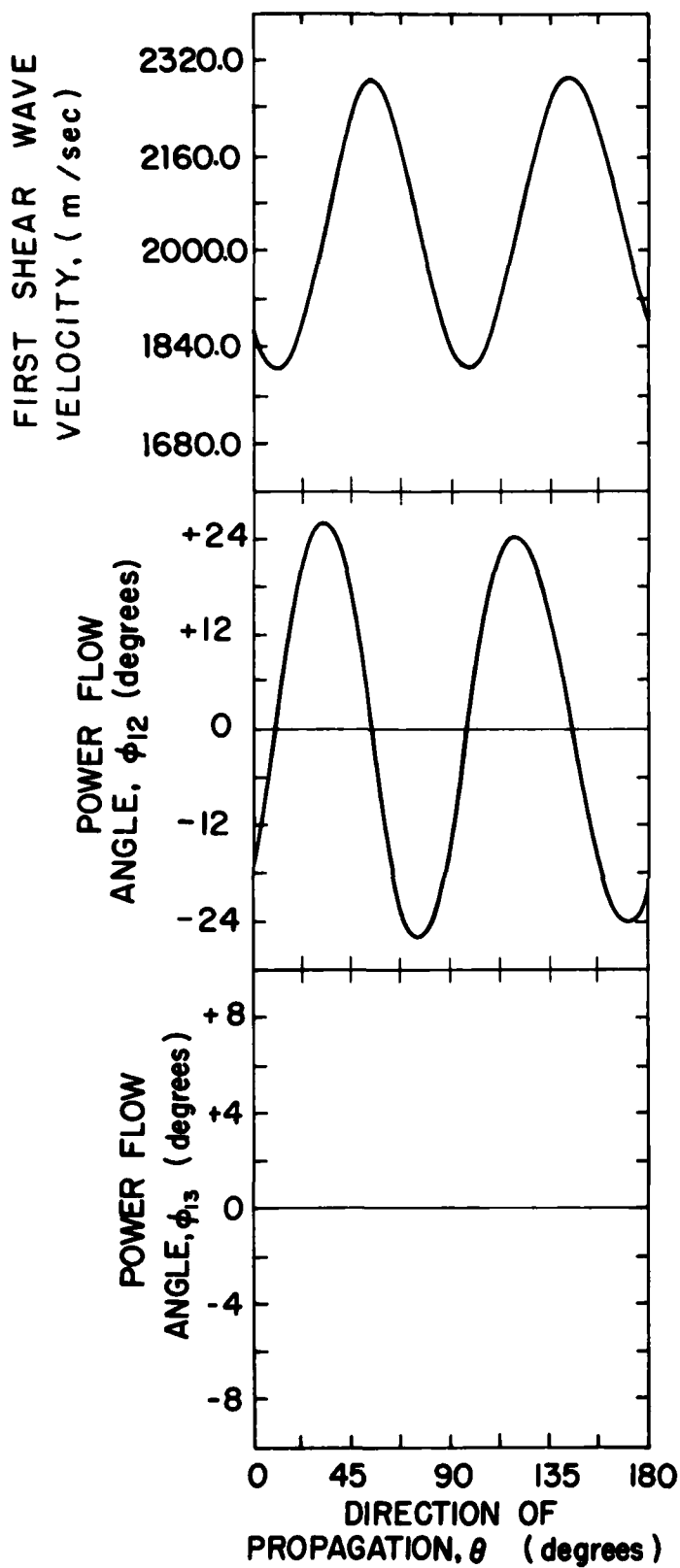
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

LONGITUDINAL WAVE
VELOCITY, (m/sec)

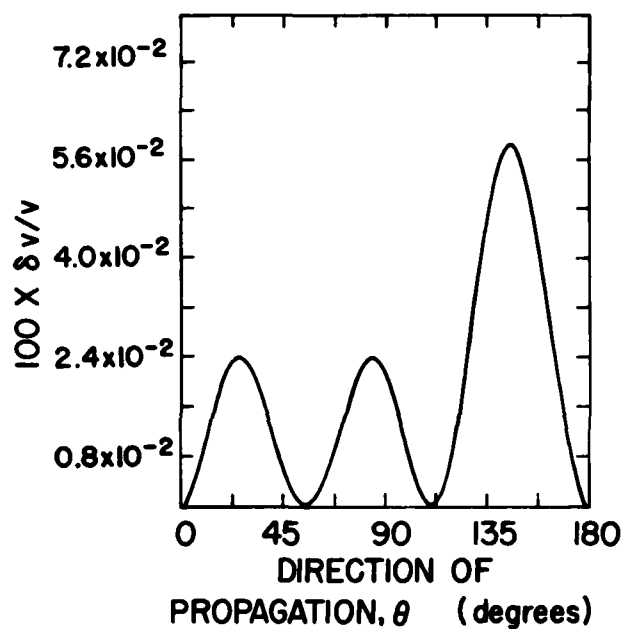


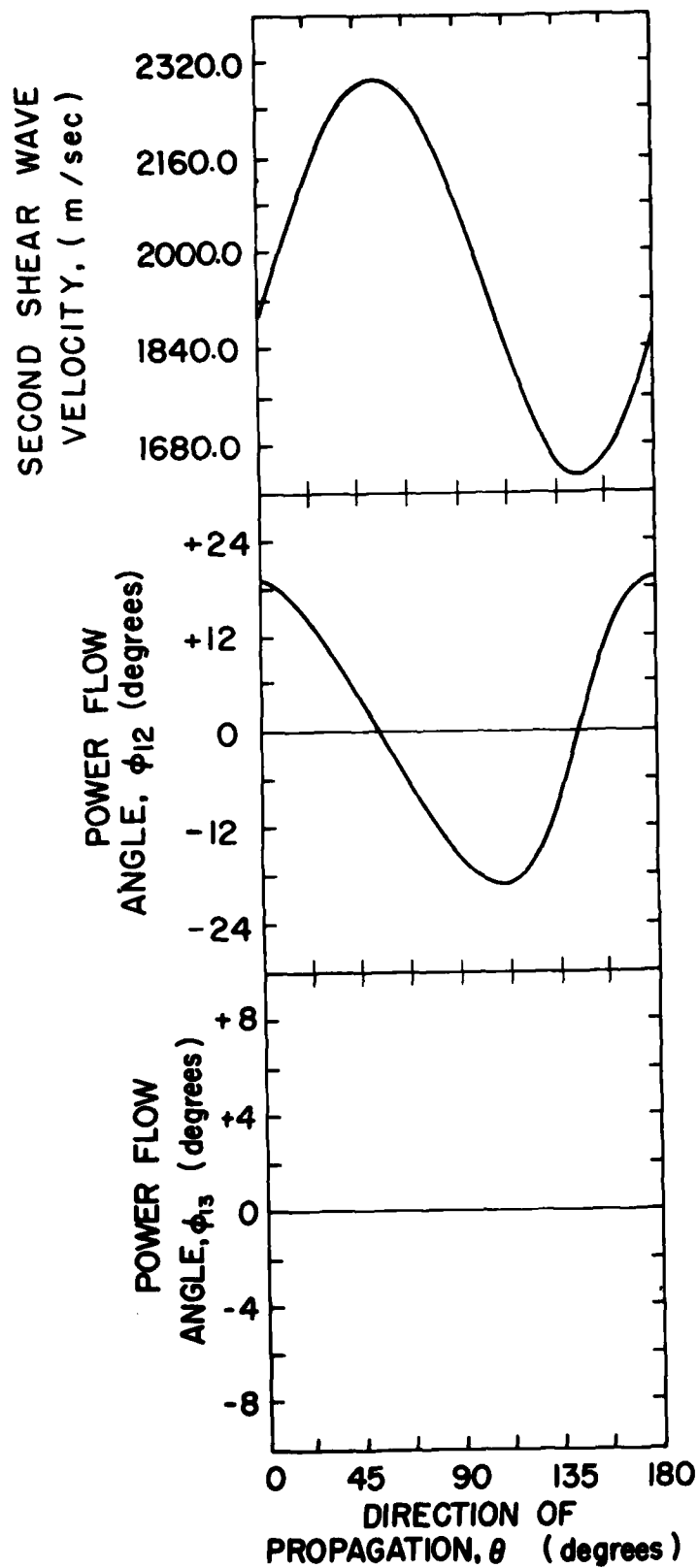
110 - PLANE
InSb



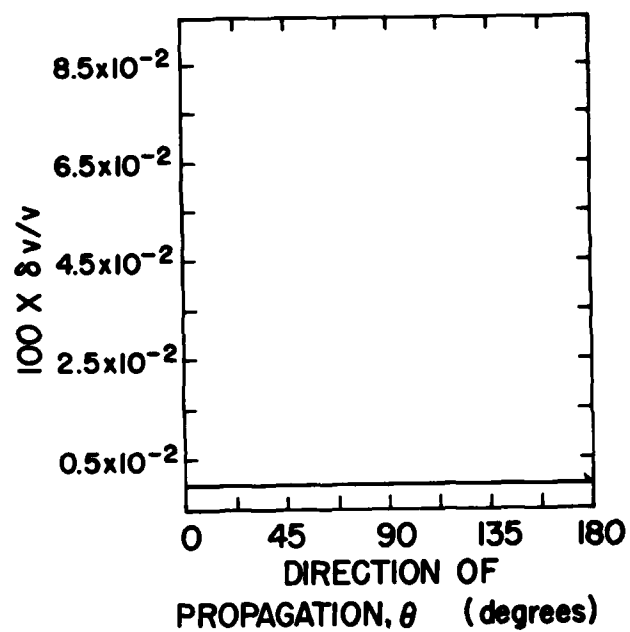


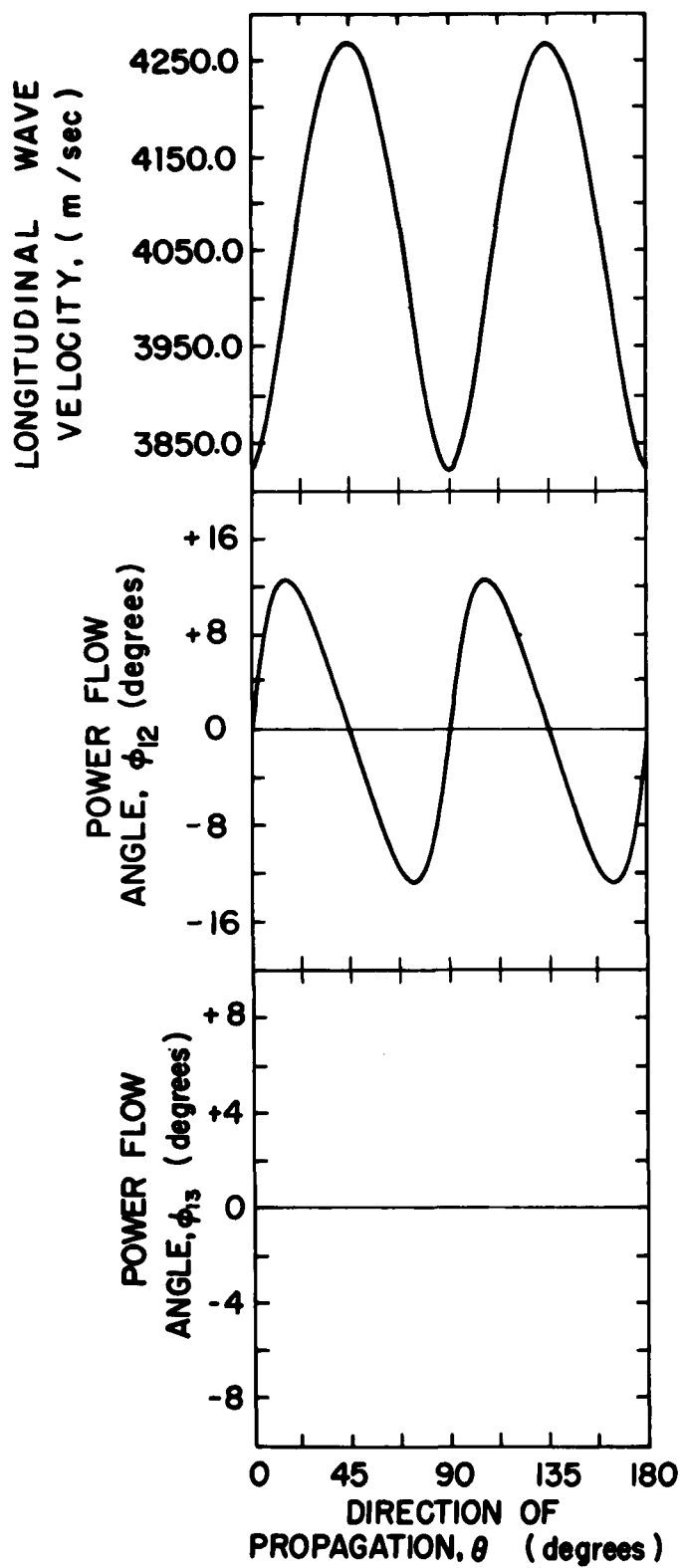
110 - PLANE
InSb



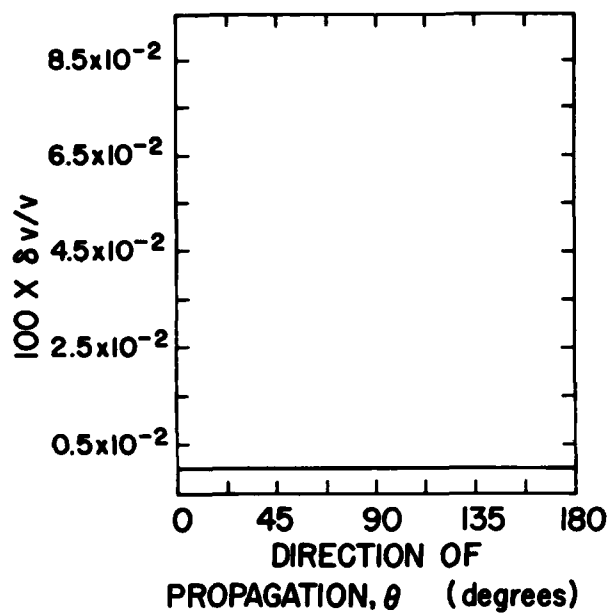


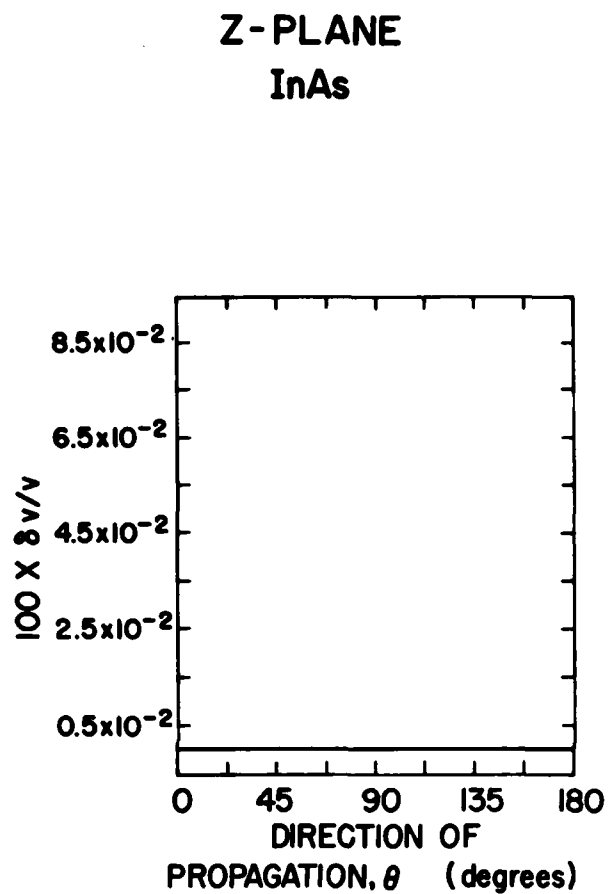
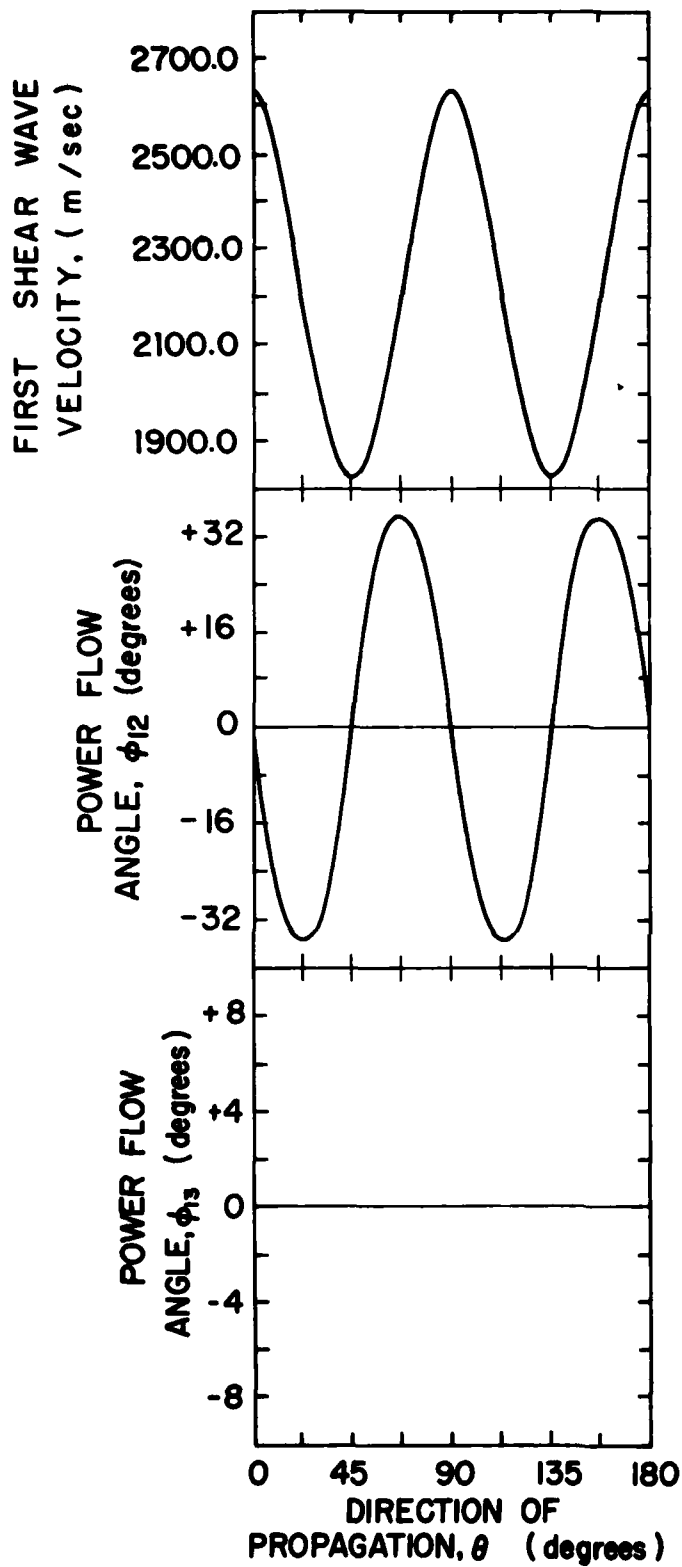
IIO - PLANE
InSb



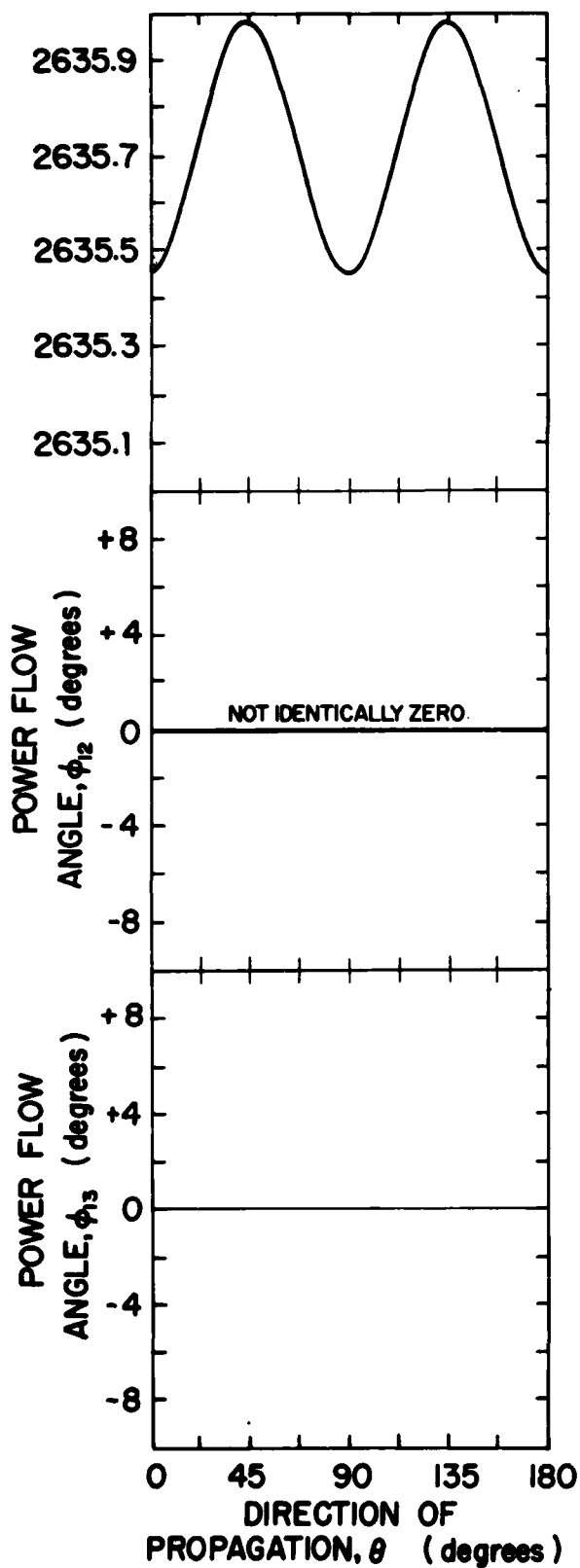


Z-PLANE InAs

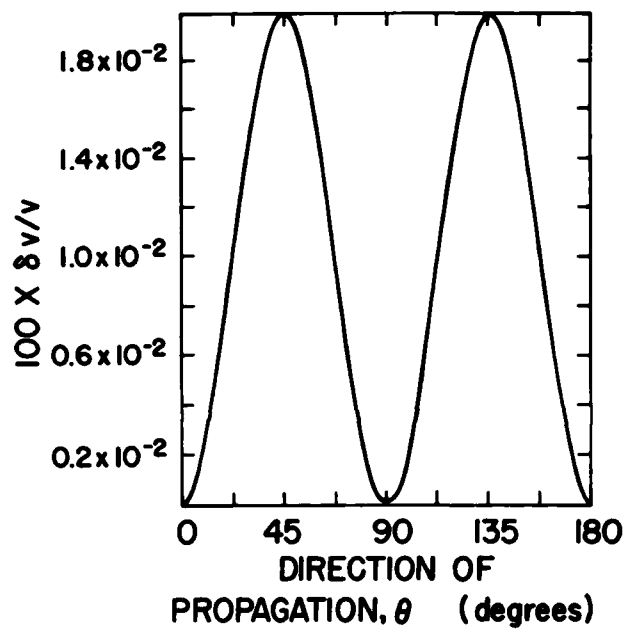


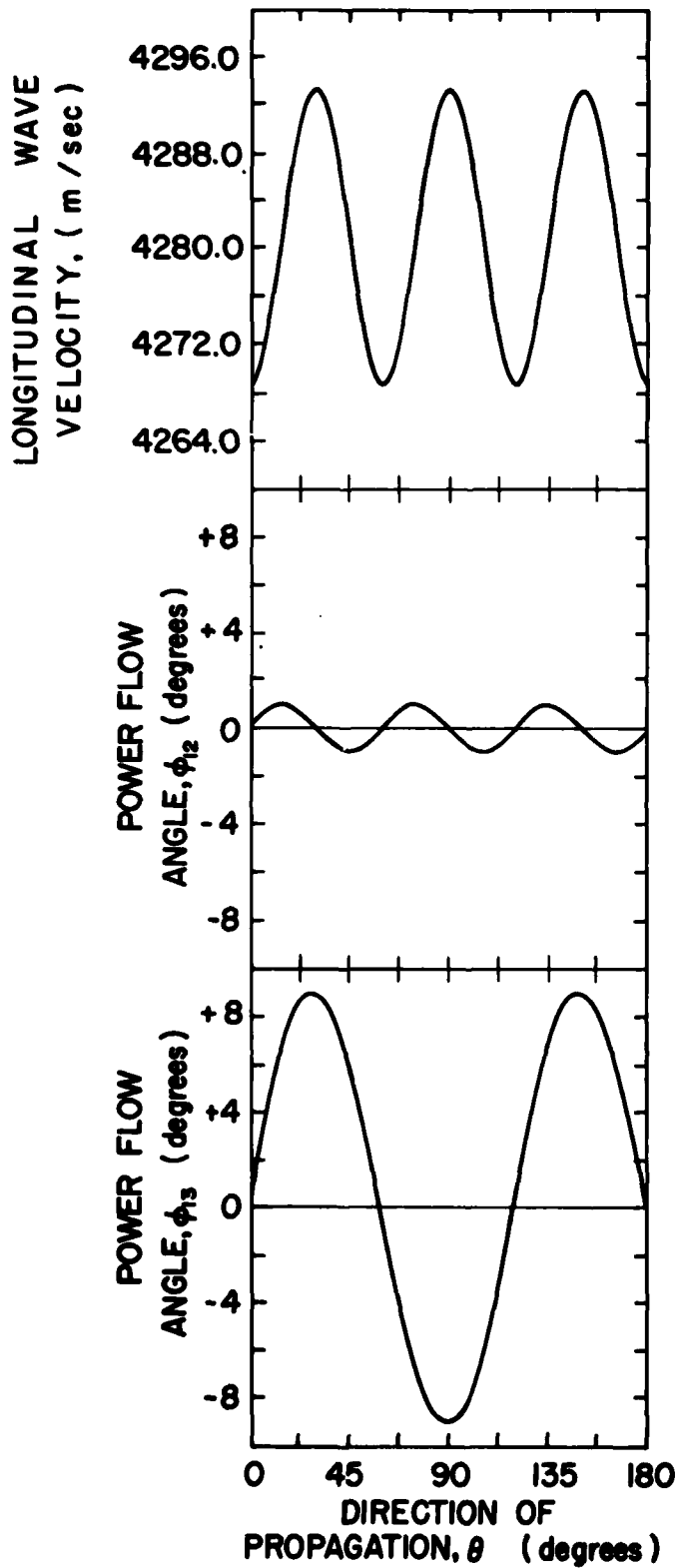


SECOND SHEAR WAVE
VELOCITY, (m/sec)

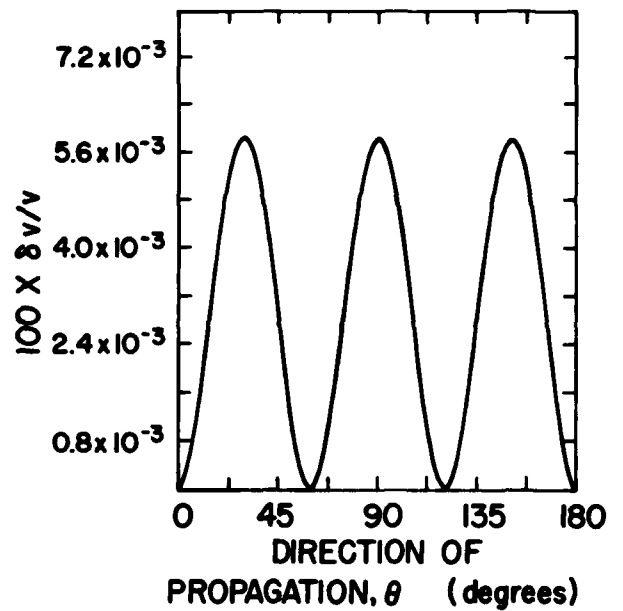


Z-PLANE
InAs





III-PLANE InAs



FIRST SHEAR WAVE
VELOCITY, (m/sec)

2660.0
2580.0
2500.0
2420.0
2340.0

POWER FLOW
ANGLE, ϕ_{12} (degrees)

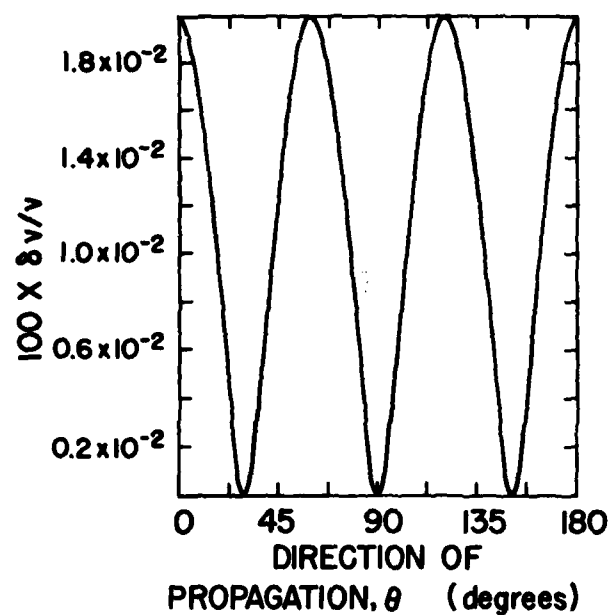
+16
+8
0
-8
-16

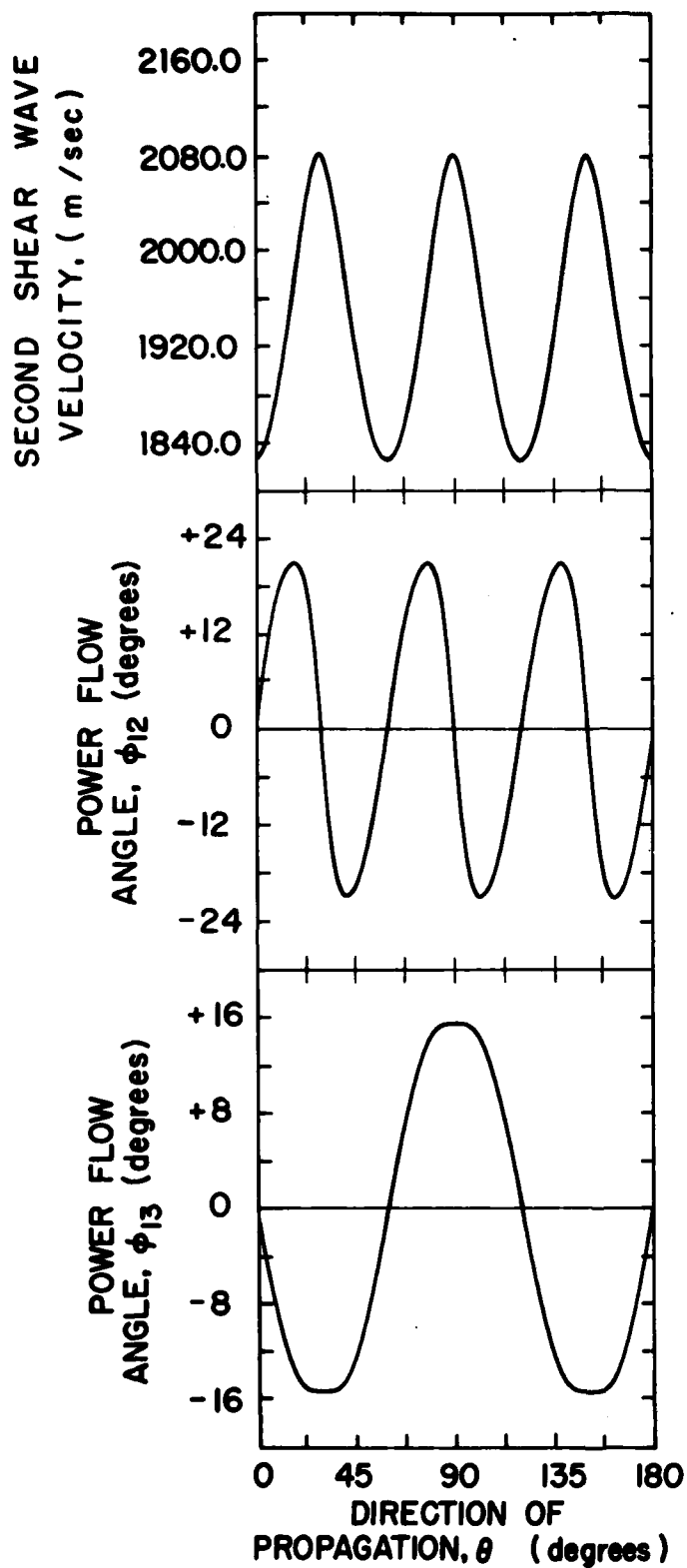
POWER FLOW
ANGLE, ϕ_{13} (degrees)

+16
+8
0
-8
-16

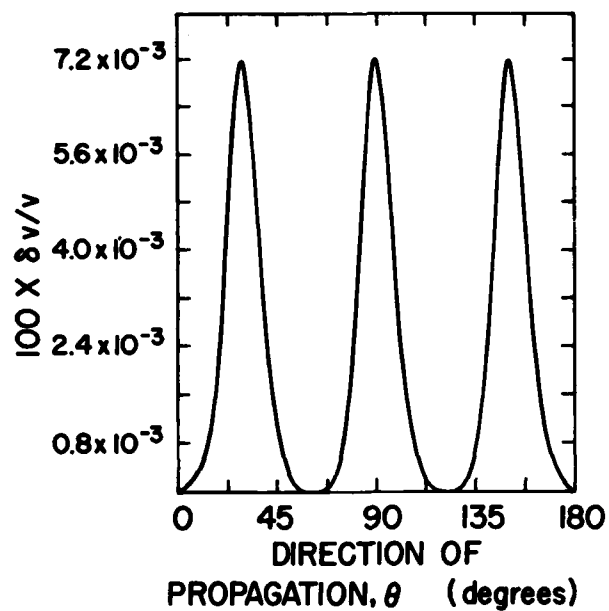
0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

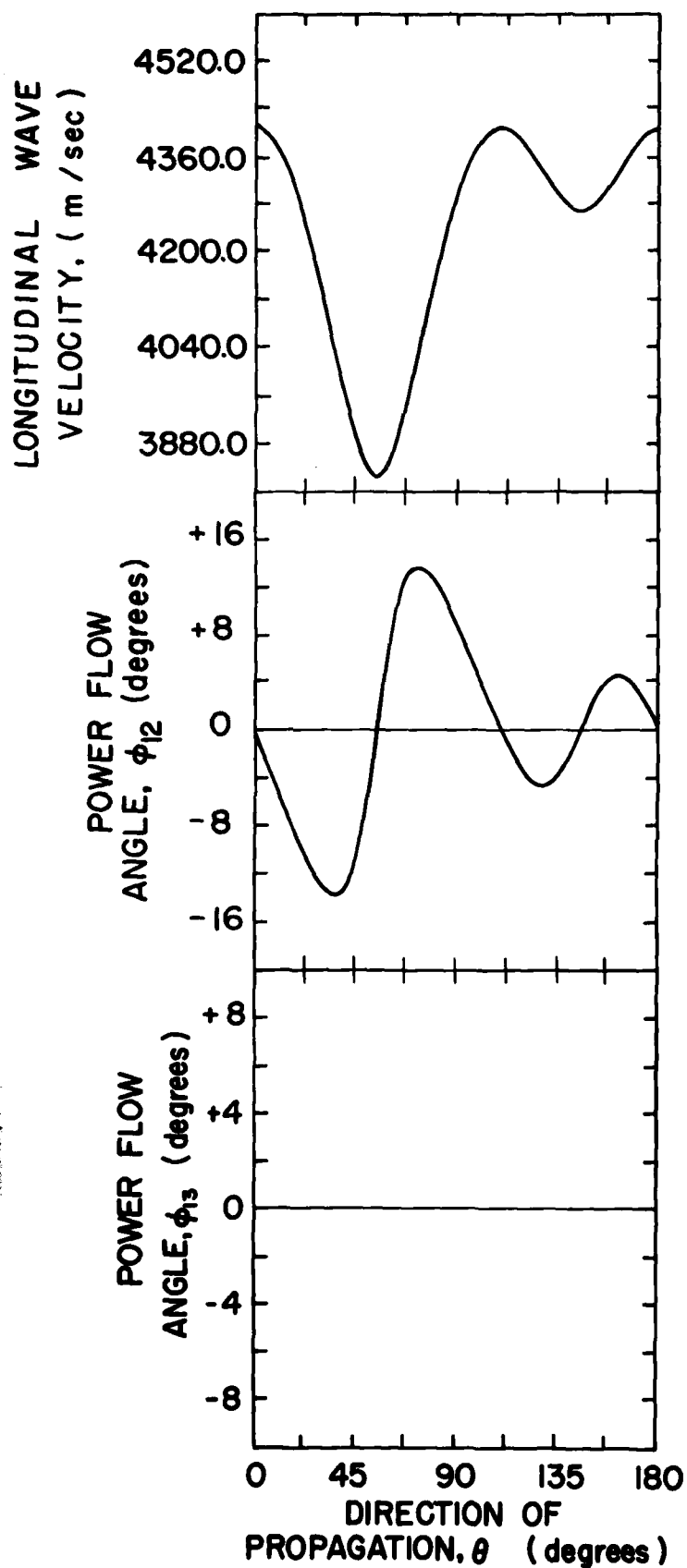
III-PLANE
InAs



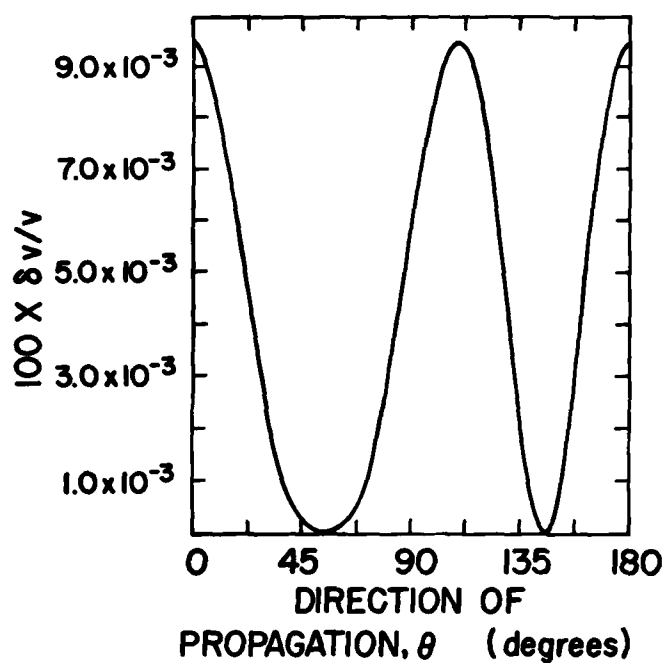


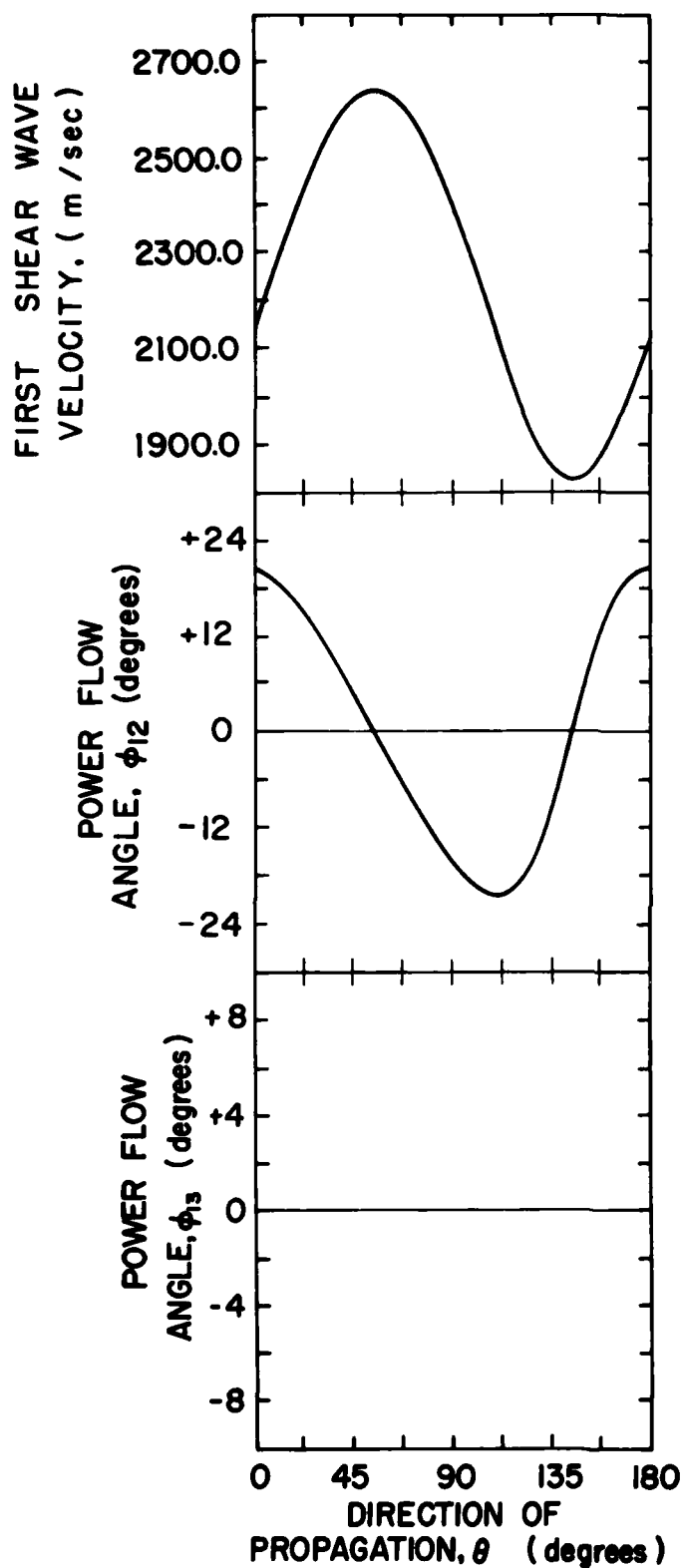
III-PLANE InAs



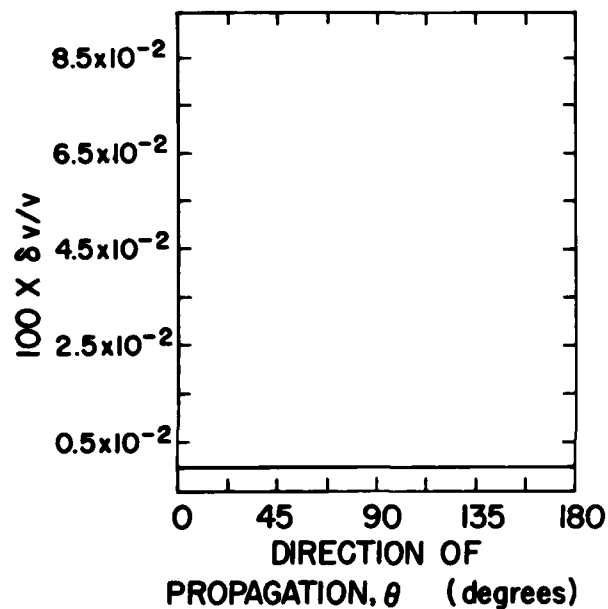


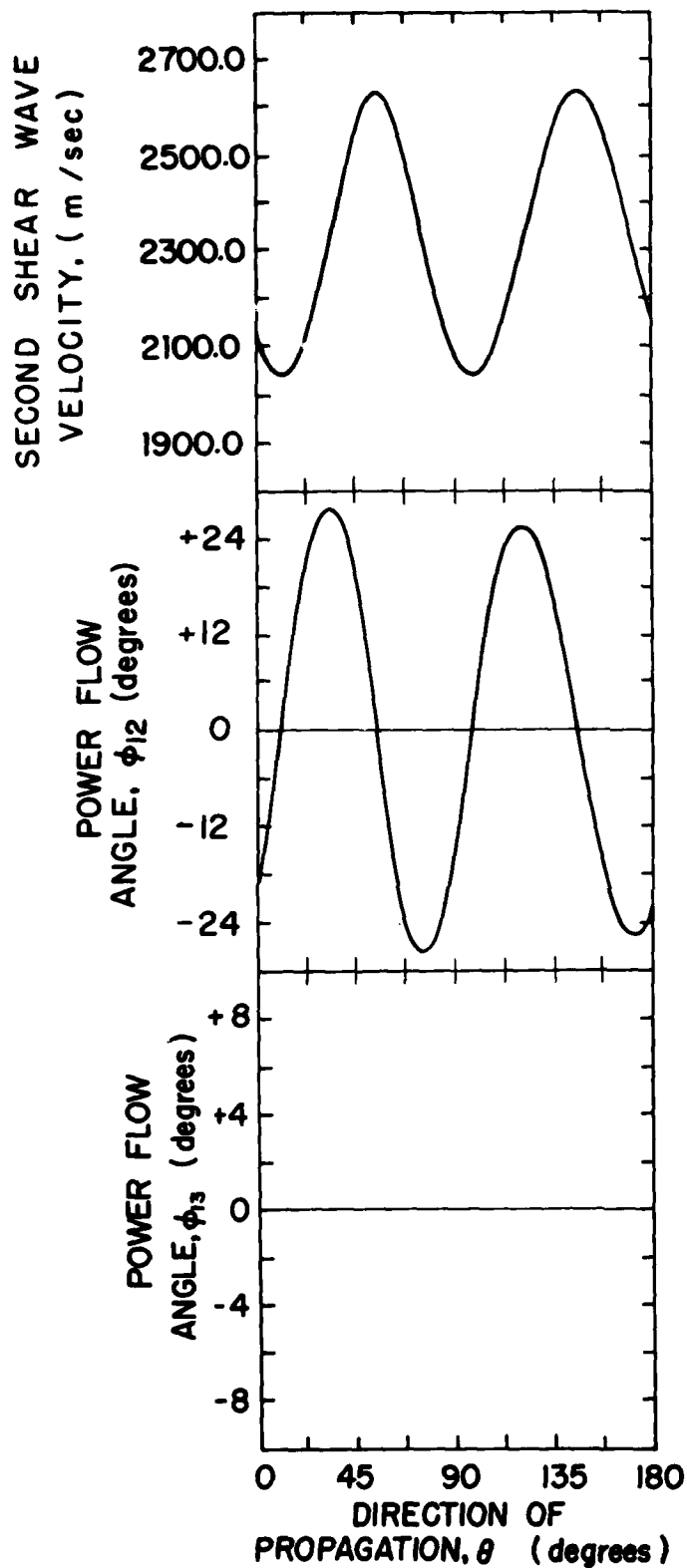
110 - PLANE InAs



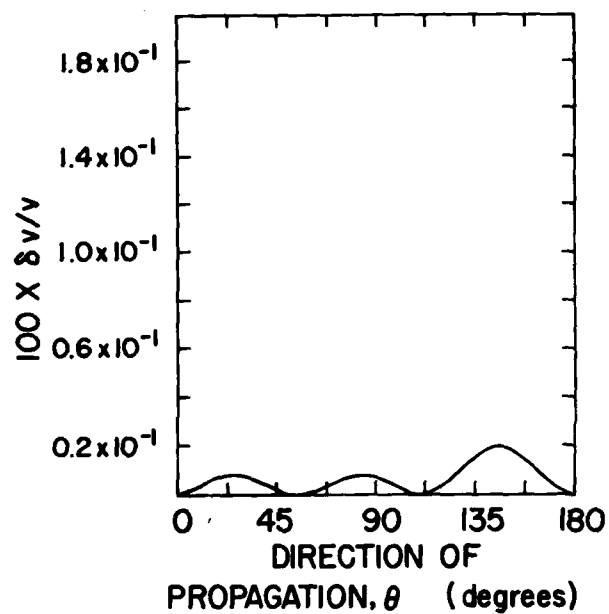


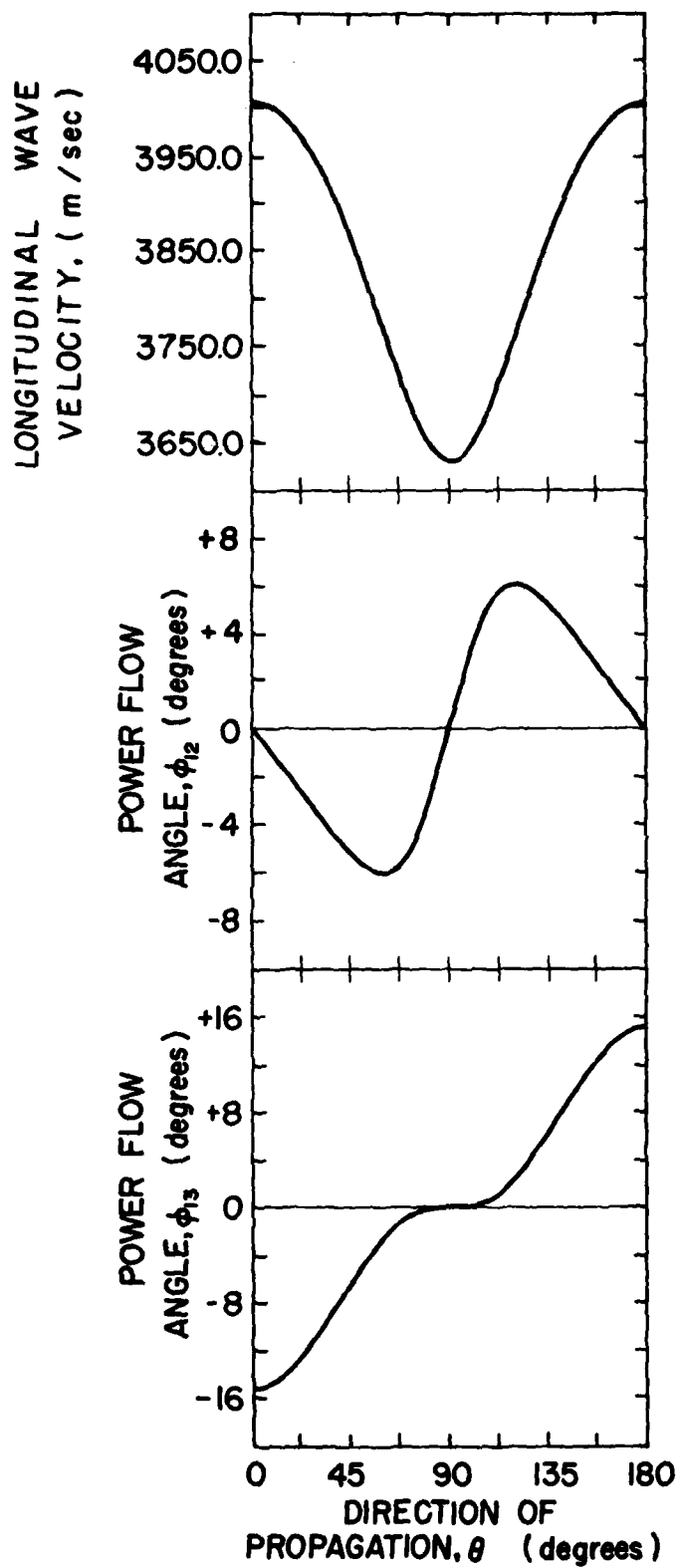
110 - PLANE
InAs





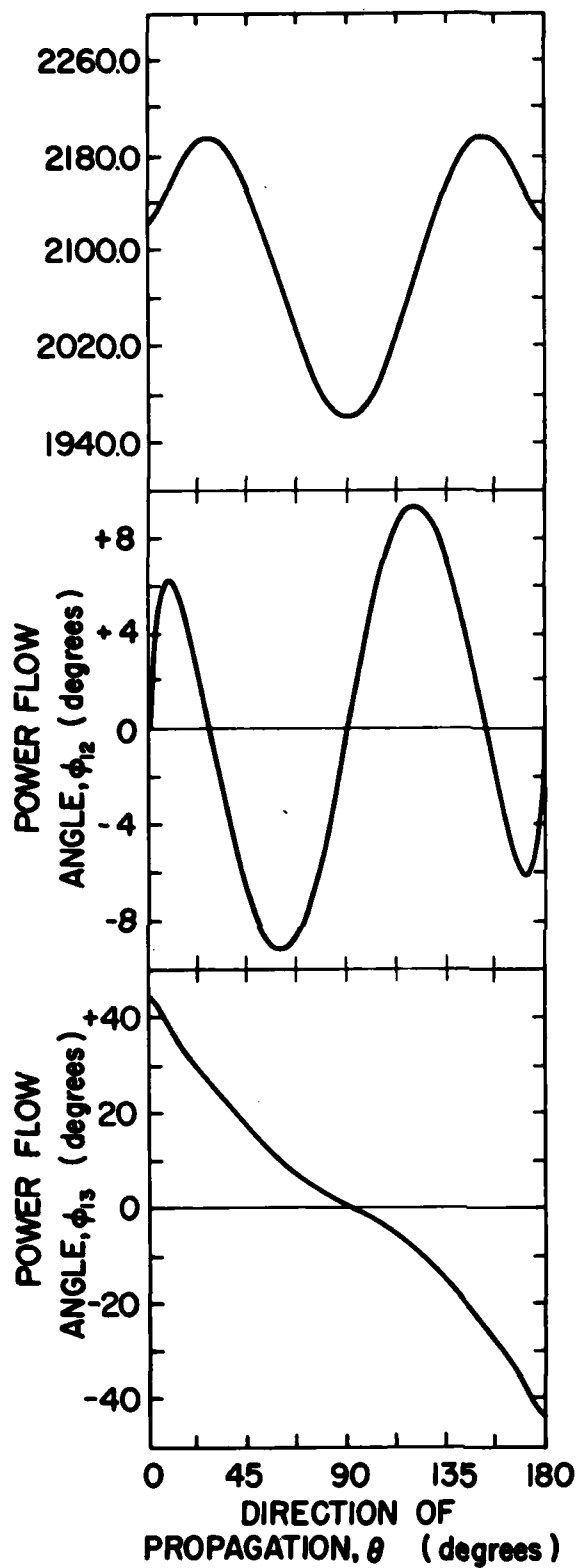
110 - PLANE
InAs





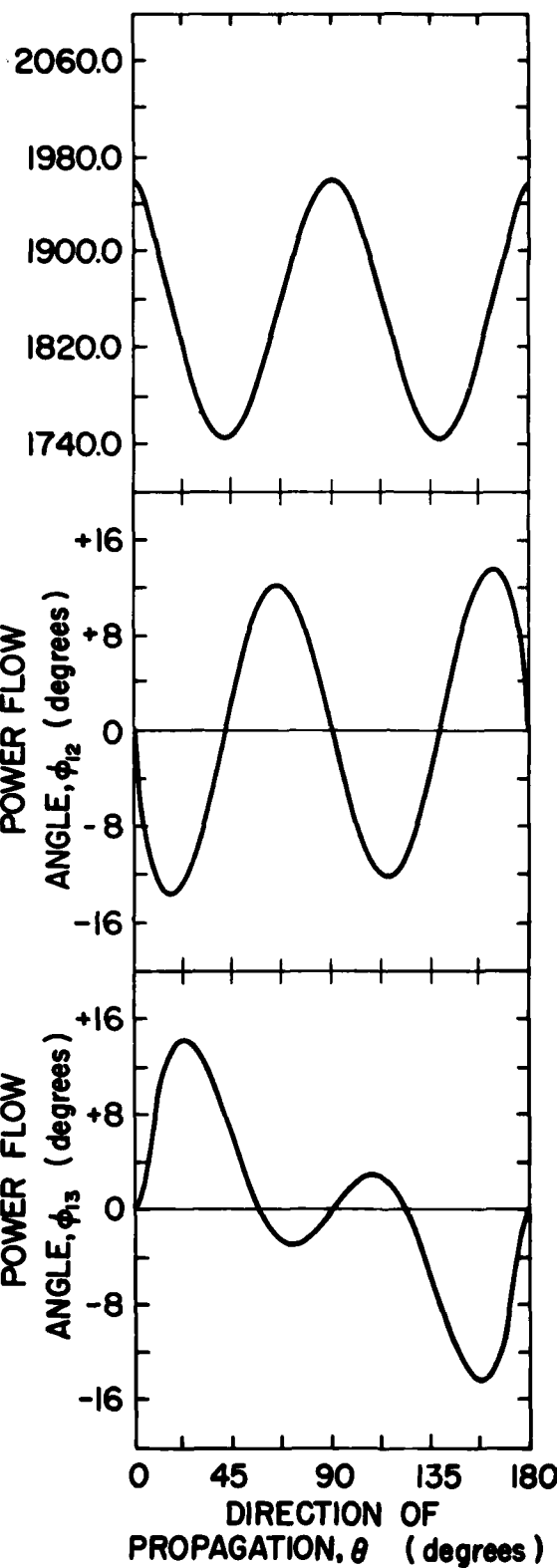
X-PLANE + Y-PLANE
LEAD MOLYBDATE

FIRST SHEAR WAVE
VELOCITY, (m / sec)



X-PLANE + Y-PLANE
LEAD MOLYBDATE

SECOND SHEAR WAVE
VELOCITY, (m / sec)



X-PLANE + Y-PLANE
LEAD MOLYBDATE

LONGITUDINAL WAVE
VELOCITY, (m / sec)

4520.0
4360.0
4200.0
4040.0
3880.0

Z - PLANE
LEAD MOLYBDATE

POWER FLOW

ANGLE, ϕ_{12} (degrees)

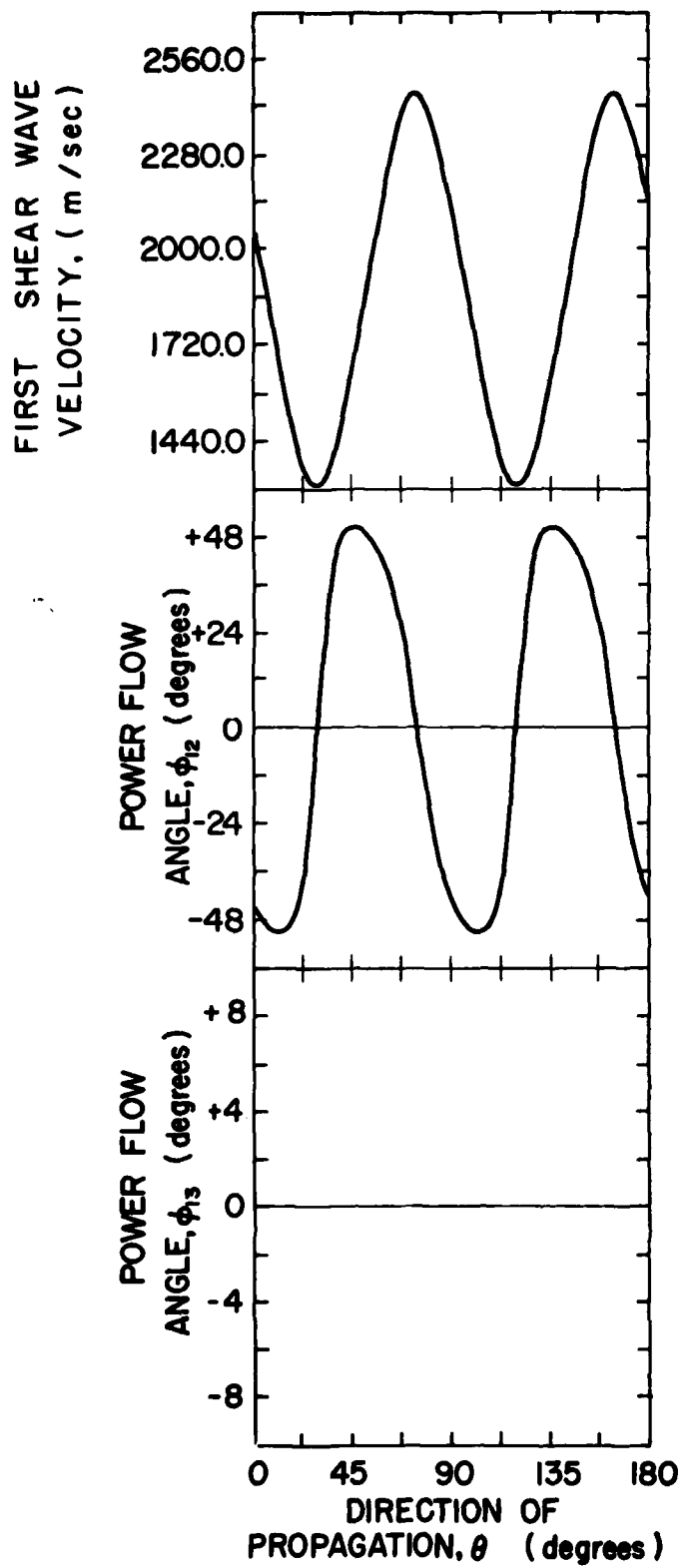
+16
+8
0
-8
-16

POWER FLOW

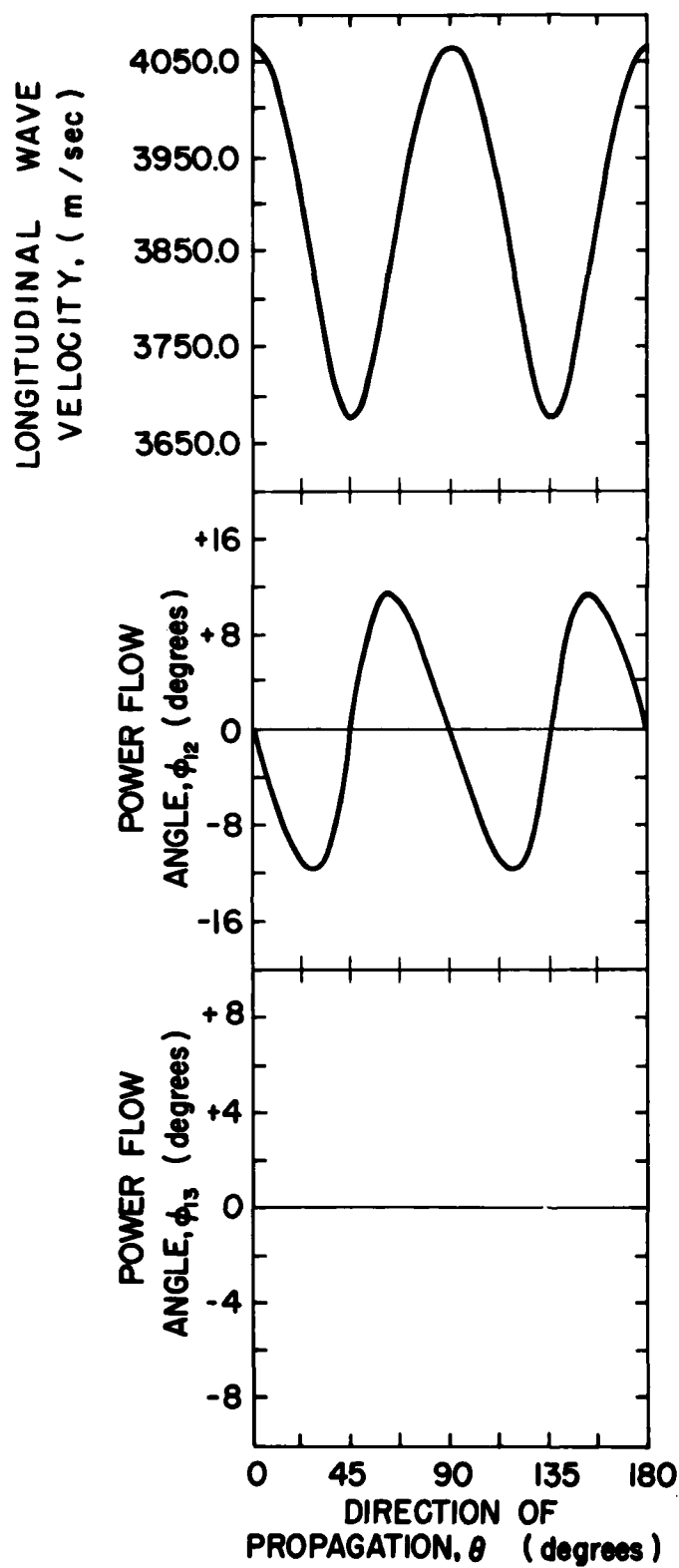
ANGLE, ϕ_{13} (degrees)

+8
+4
0
-4
-8

0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

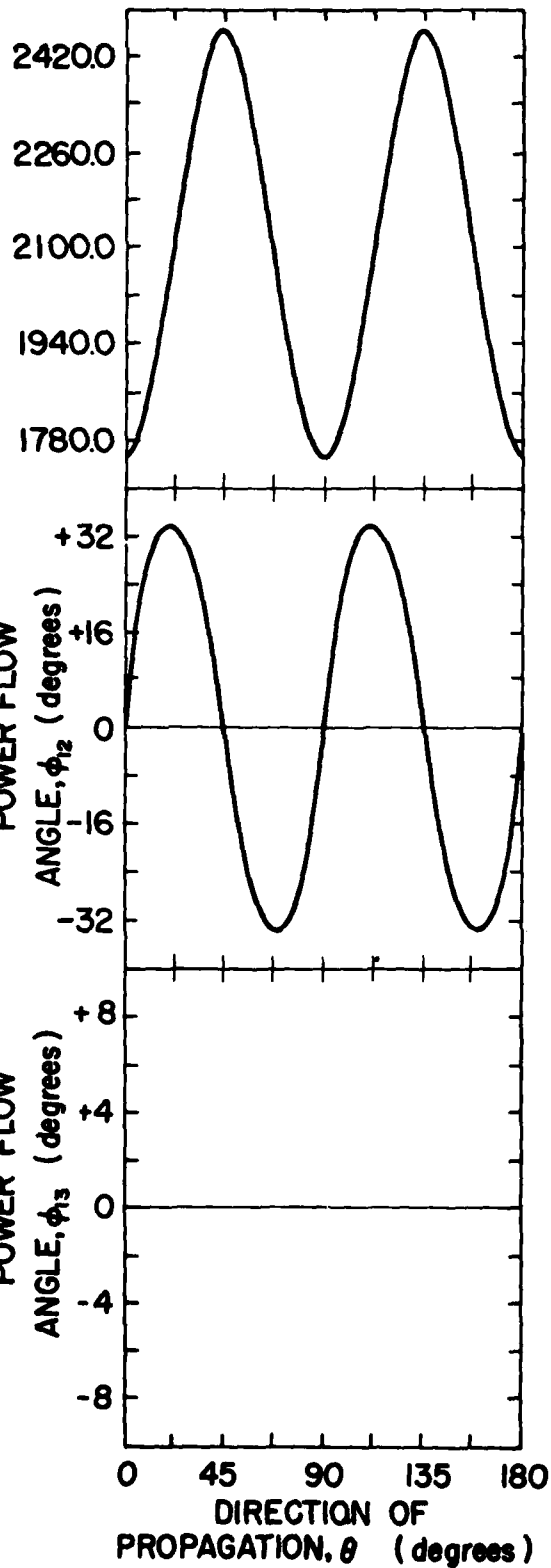


Z-PLANE
LEAD MOLYBDATE

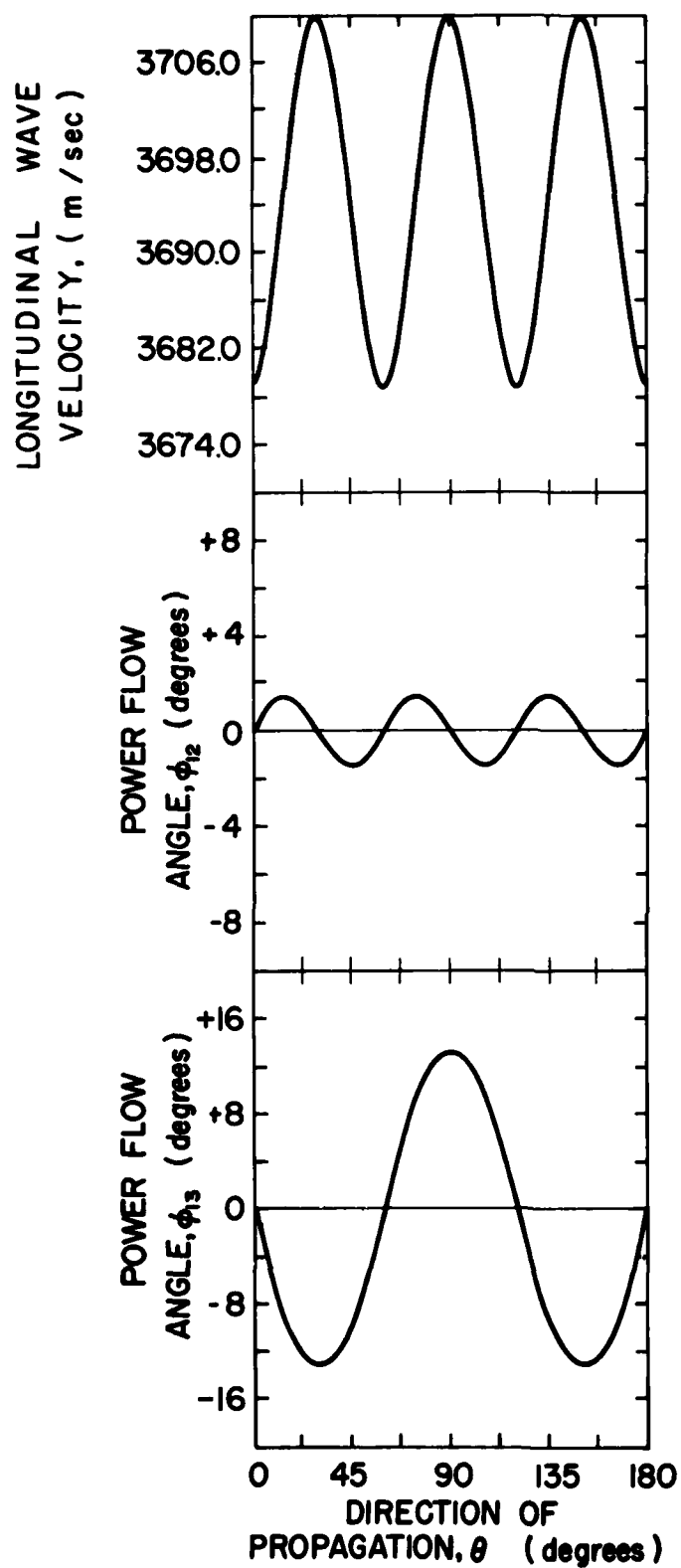


Z-PLANE
PbS

FIRST SHEAR WAVE
VELOCITY, (m / sec)

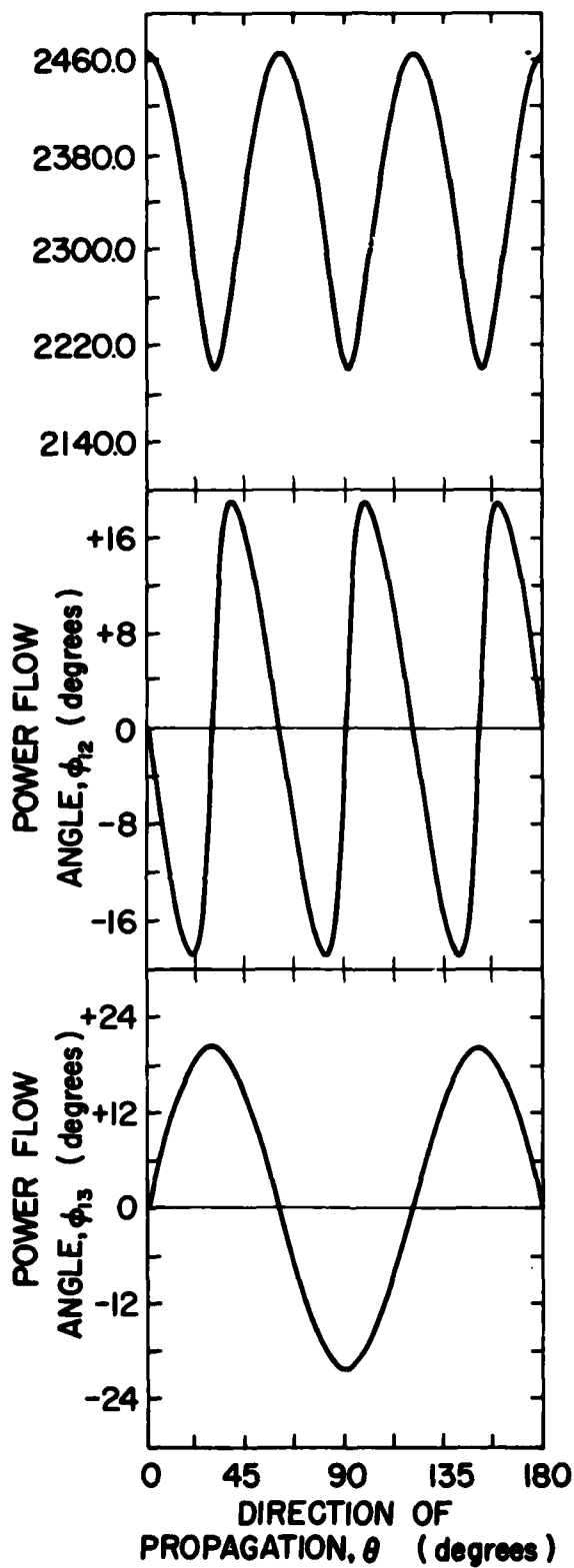


Z-PLANE
Pb S



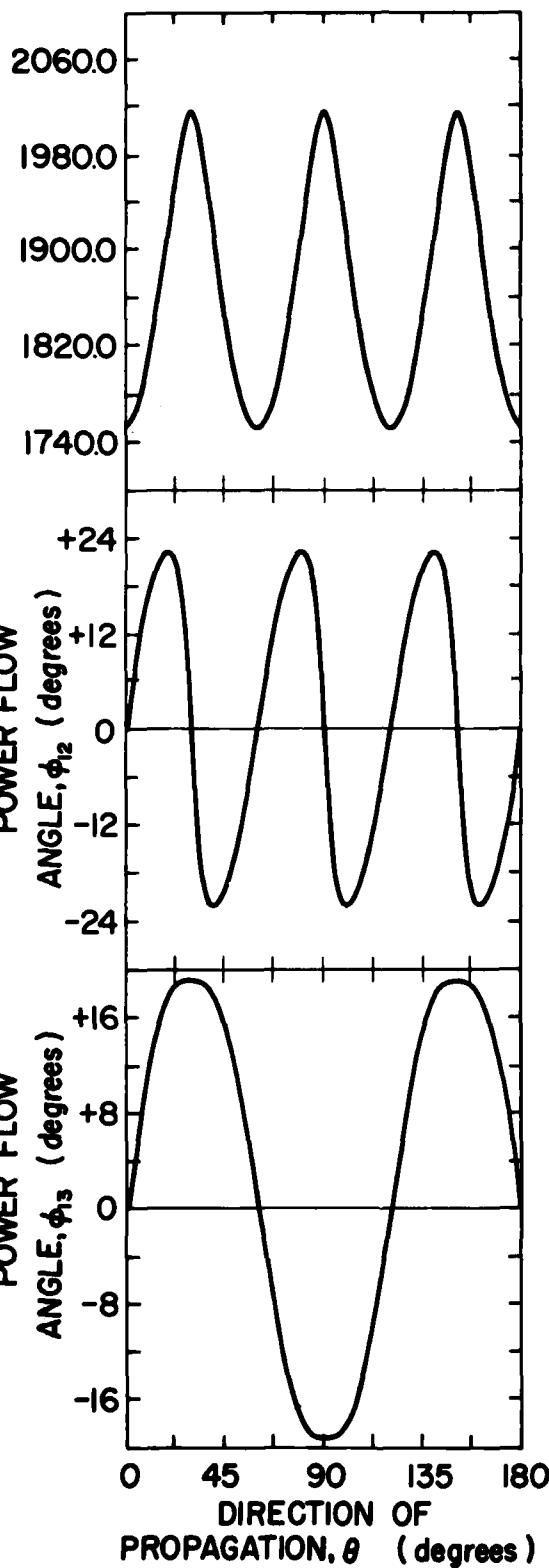
III-PLANE
Pb S

FIRST SHEAR WAVE
VELOCITY, (m/sec)

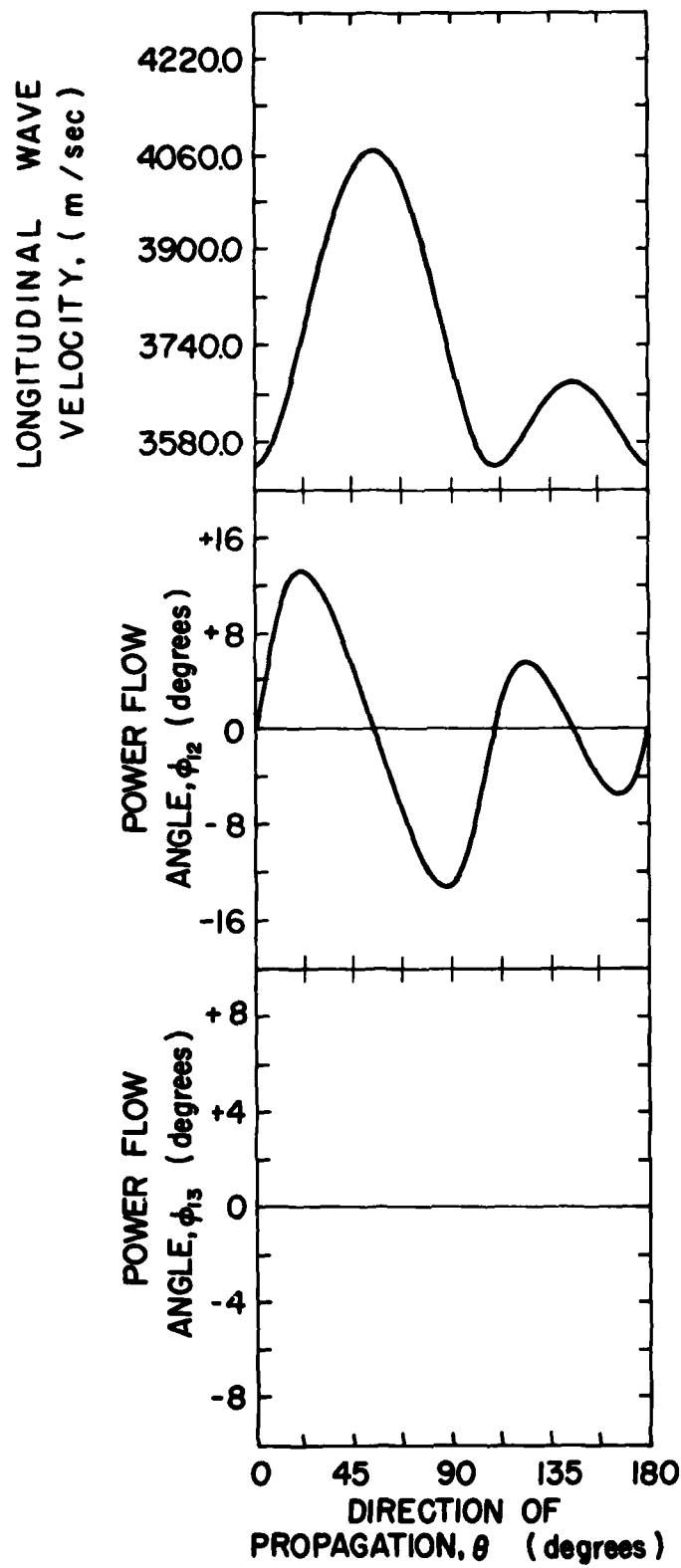


III-PLANE
PbS

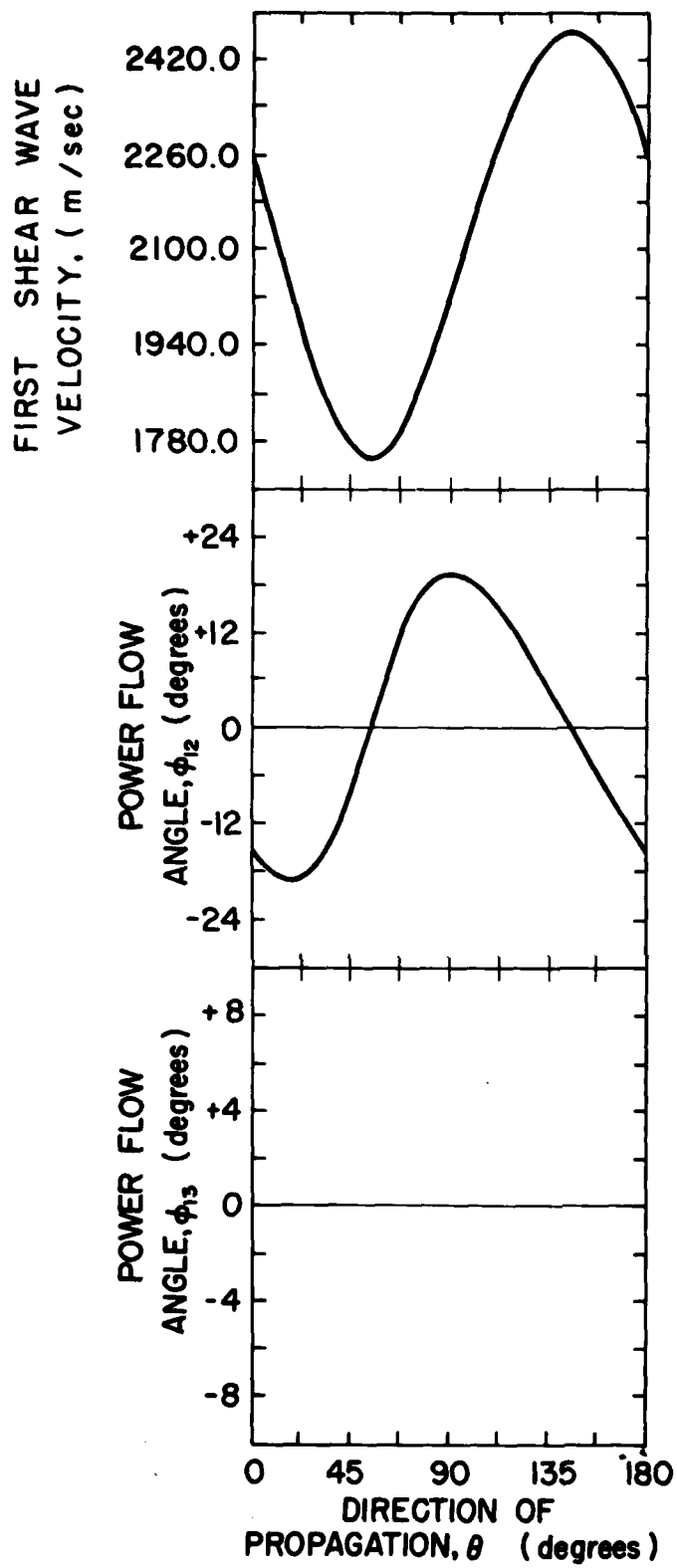
SECOND SHEAR WAVE
VELOCITY, (m / sec)



III-PLANE
PbS

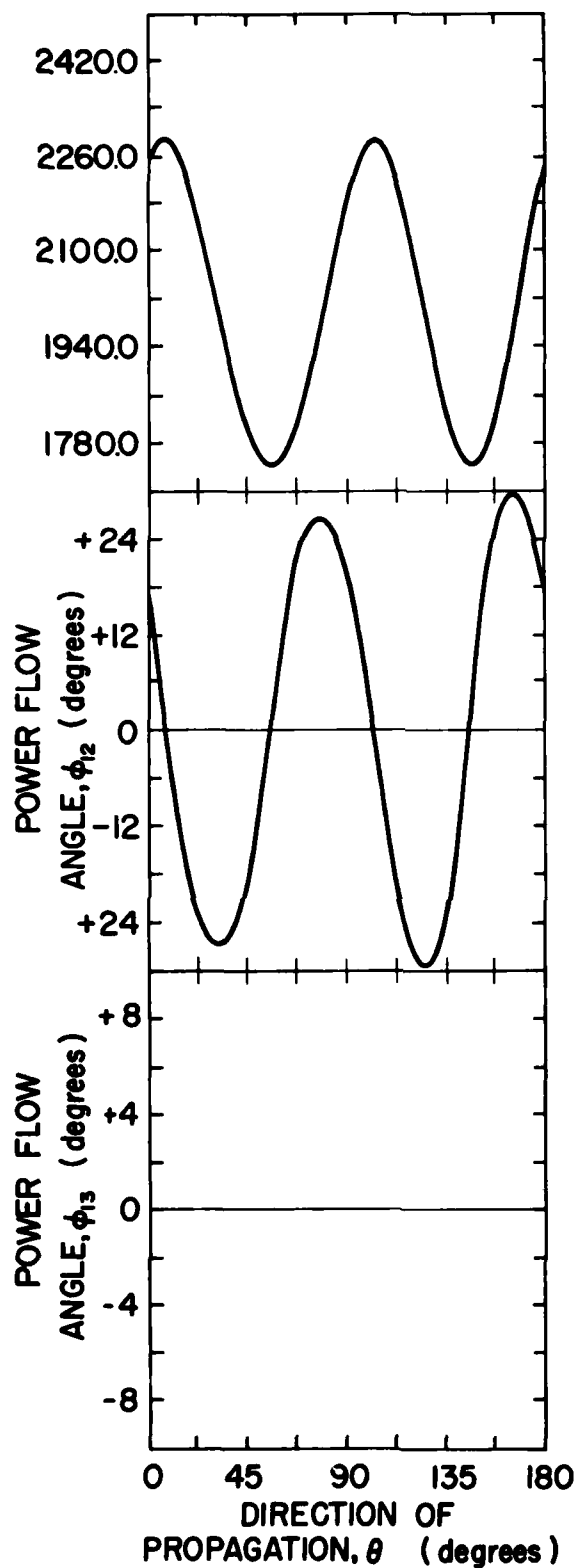


IIO-PLANE
PbS

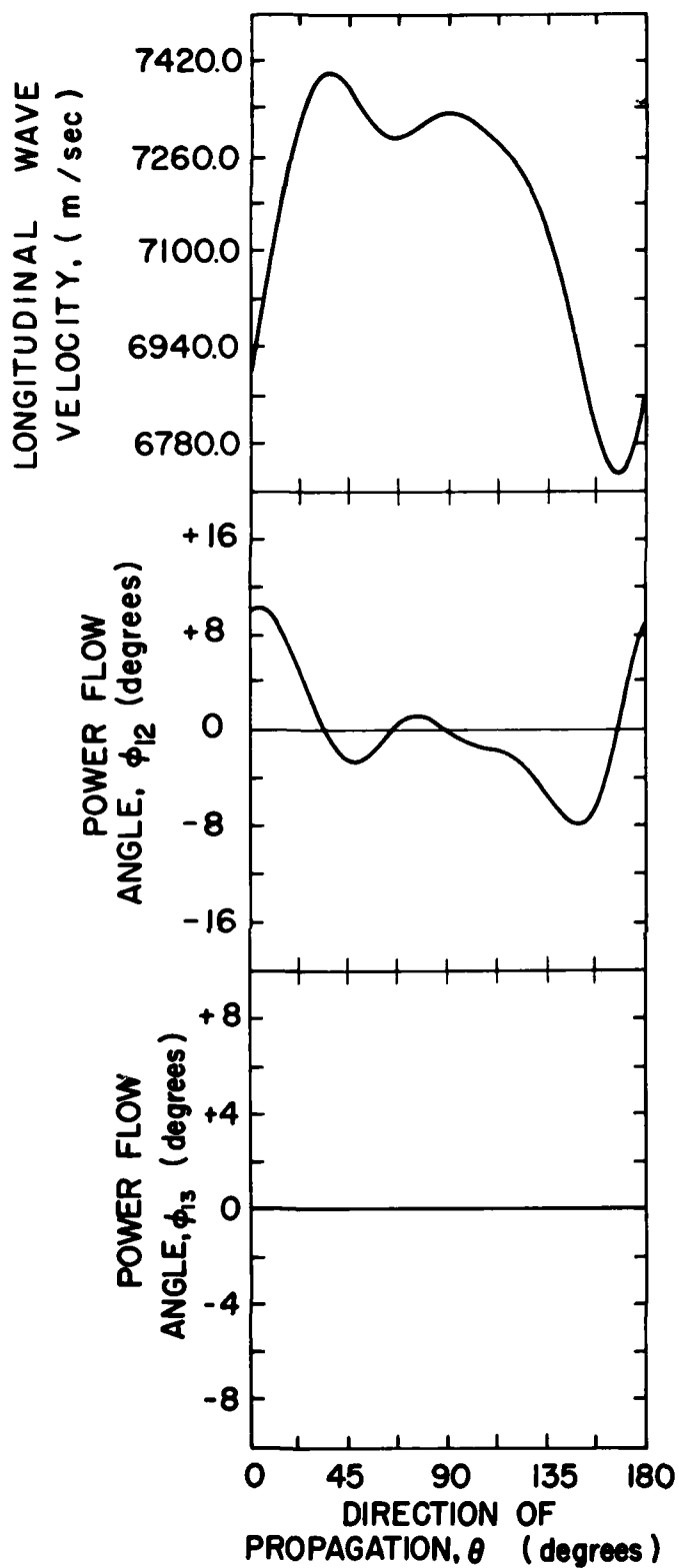


110 - PLANE
PbS

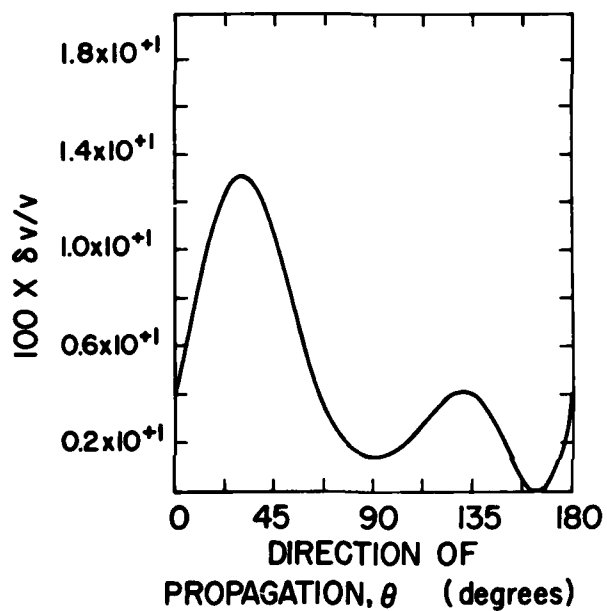
SECOND SHEAR WAVE
VELOCITY, (m/sec)

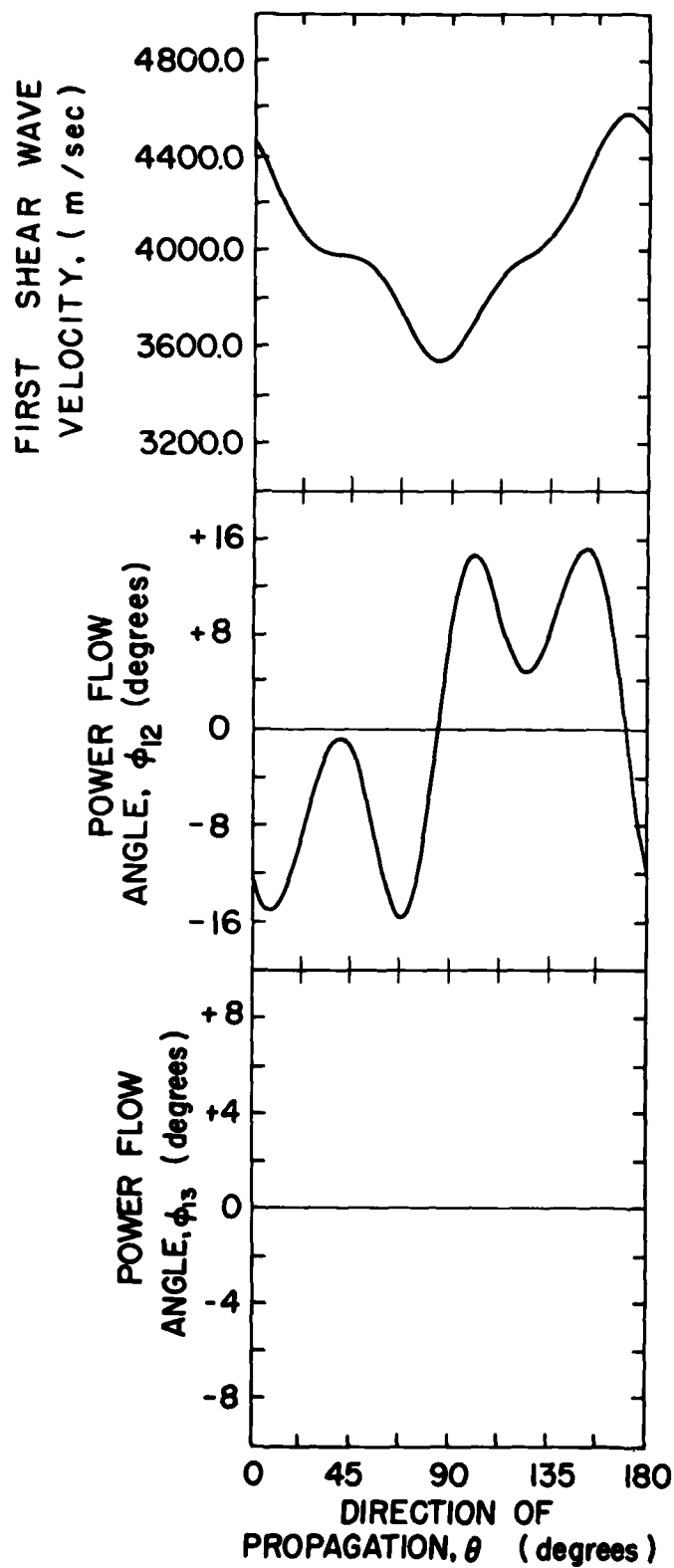


110-PLANE
PbS

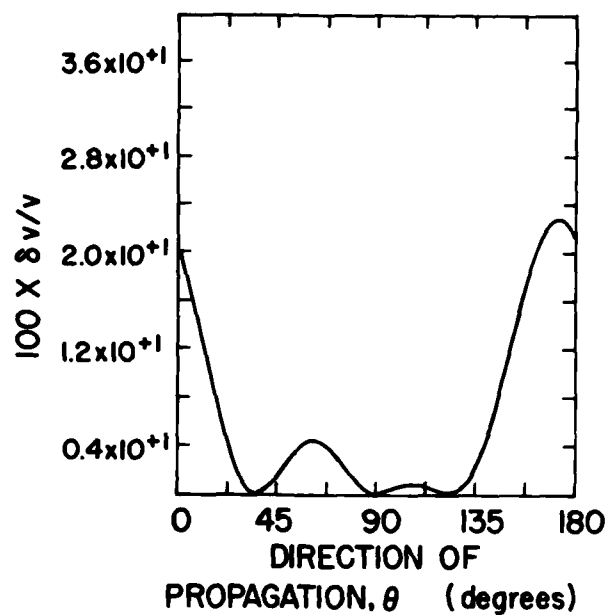


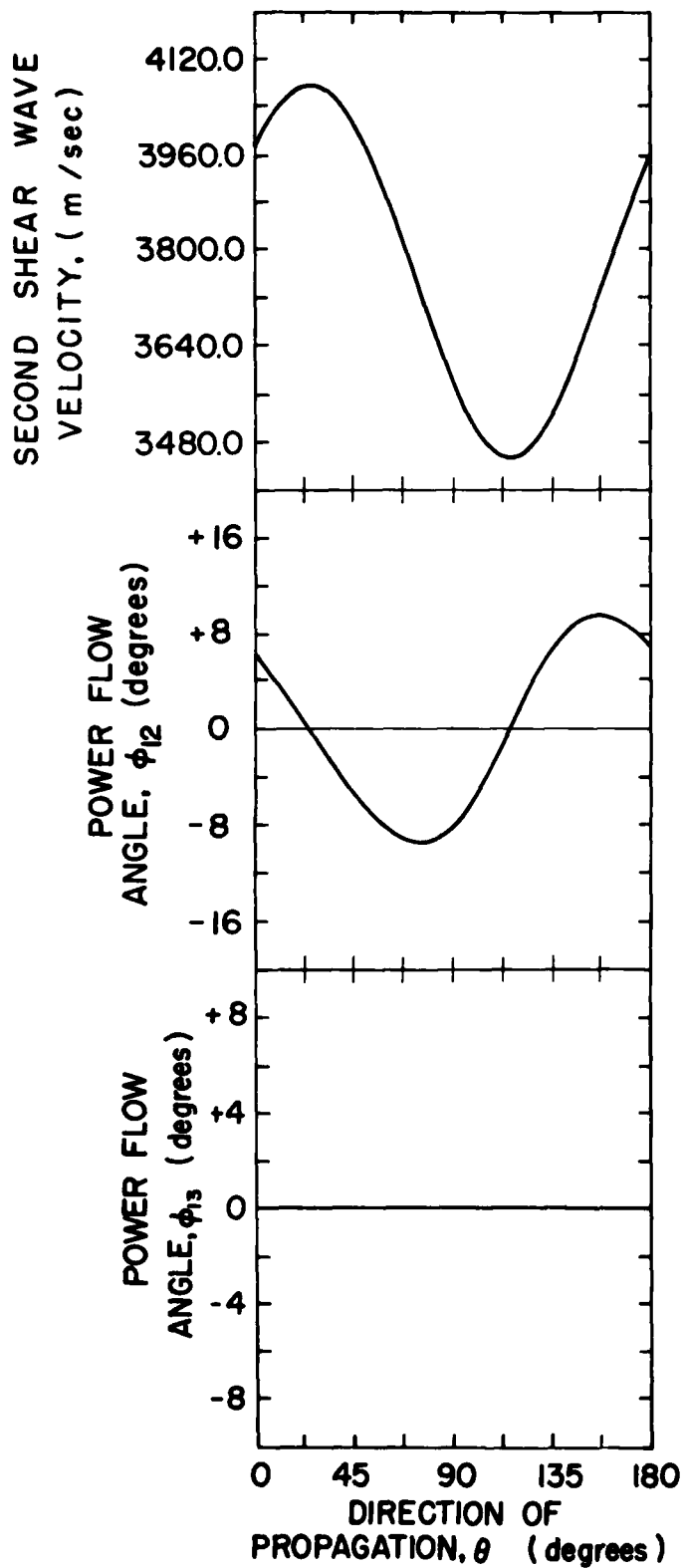
X-PLANE
 LiNbO_3
(Smith and Welsh)



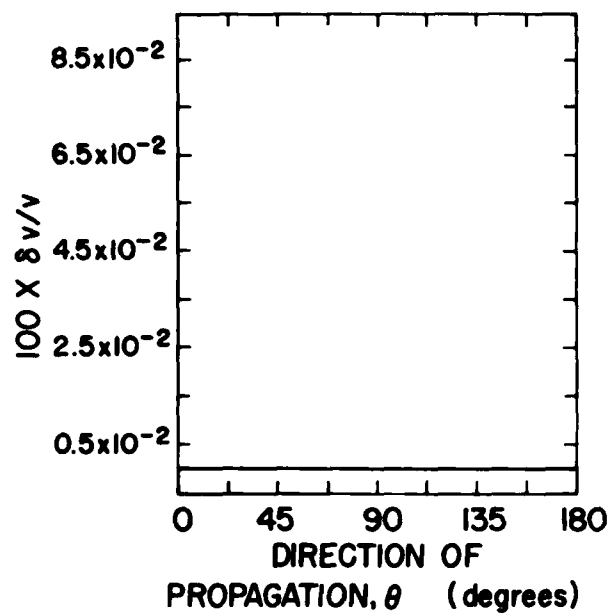


X-PLANE
 LiNbO_3
(Smith and Welsh)





X-PLANE
 LiNbO_3
(Smith and Welsh)



LONGITUDINAL WAVE
VELOCITY, (m / sec)

7320.0
7160.0
7000.0
6840.0
6680.0

POWER FLOW

ANGLE, ϕ_2 (degrees)

+8

+4

0

-4

-8

POWER FLOW

ANGLE, ϕ_3 (degrees)

+8

+4

0

-4

-8

0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

Y-PLANE
 LiNbO_3
(Smith and Welsh)

100 X $\delta v/v$

7.20

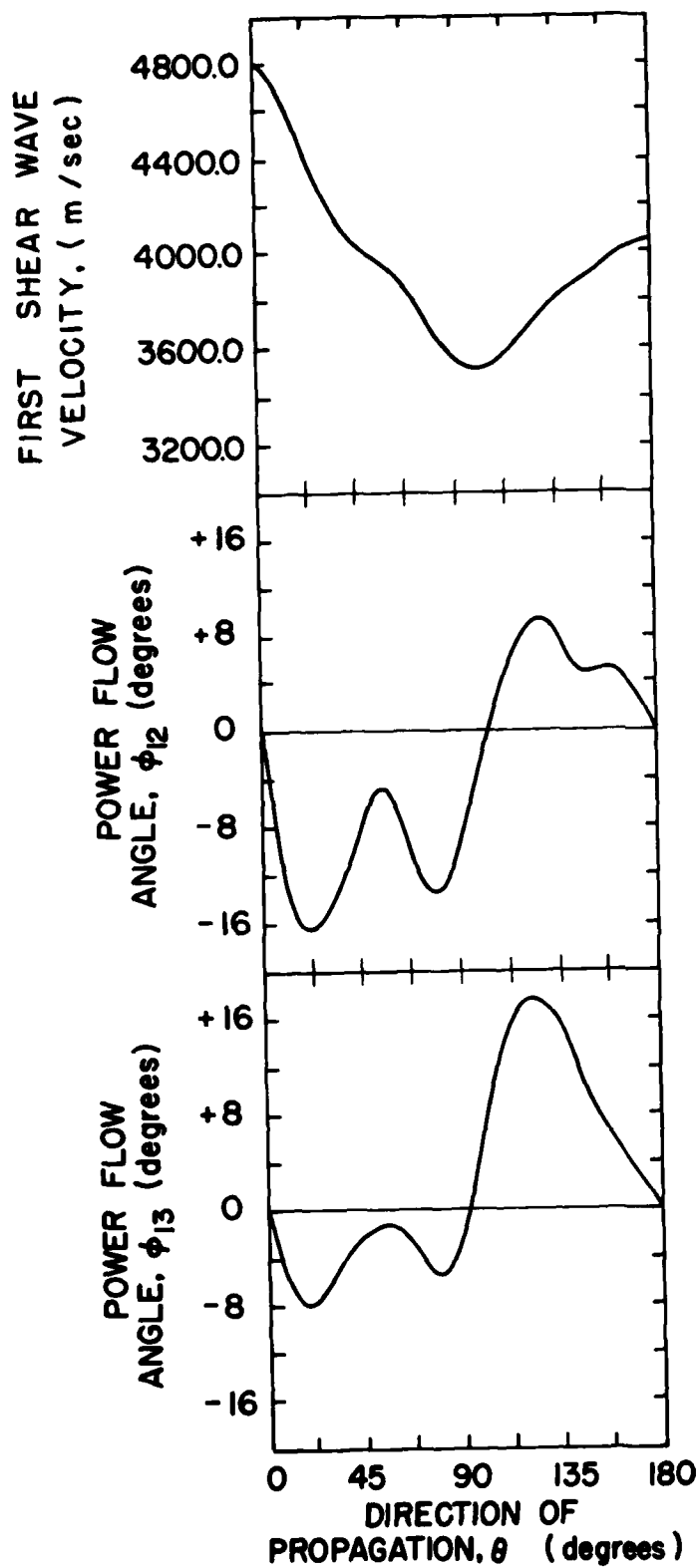
5.60

4.00

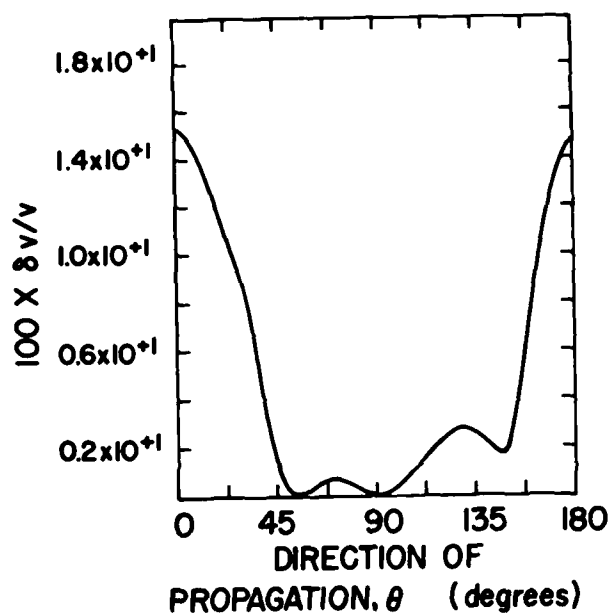
2.40

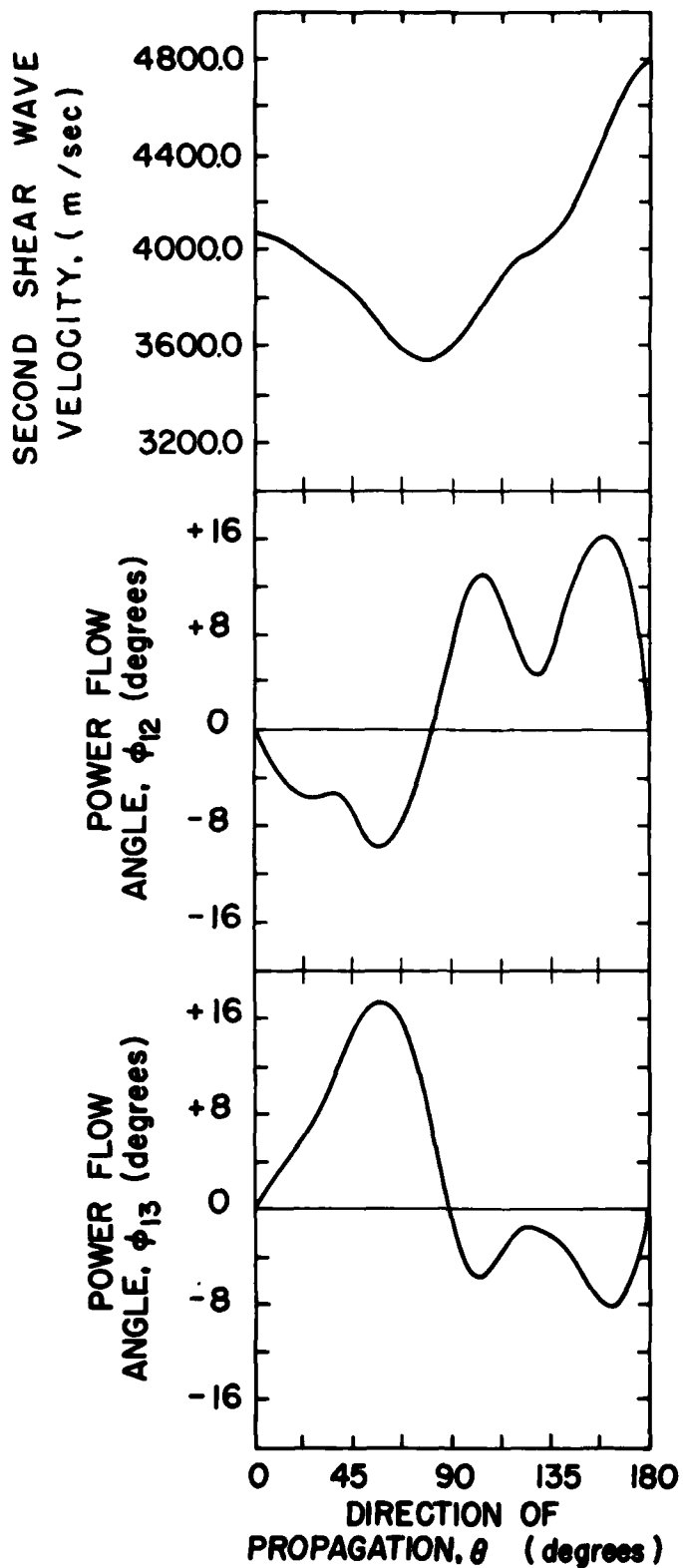
0.80

0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

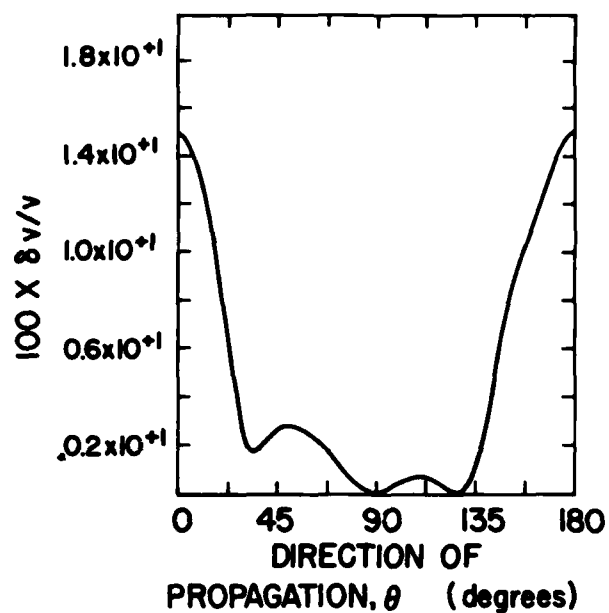


Y-PLANE
 LiNbO_3
(Smith and Welsh)

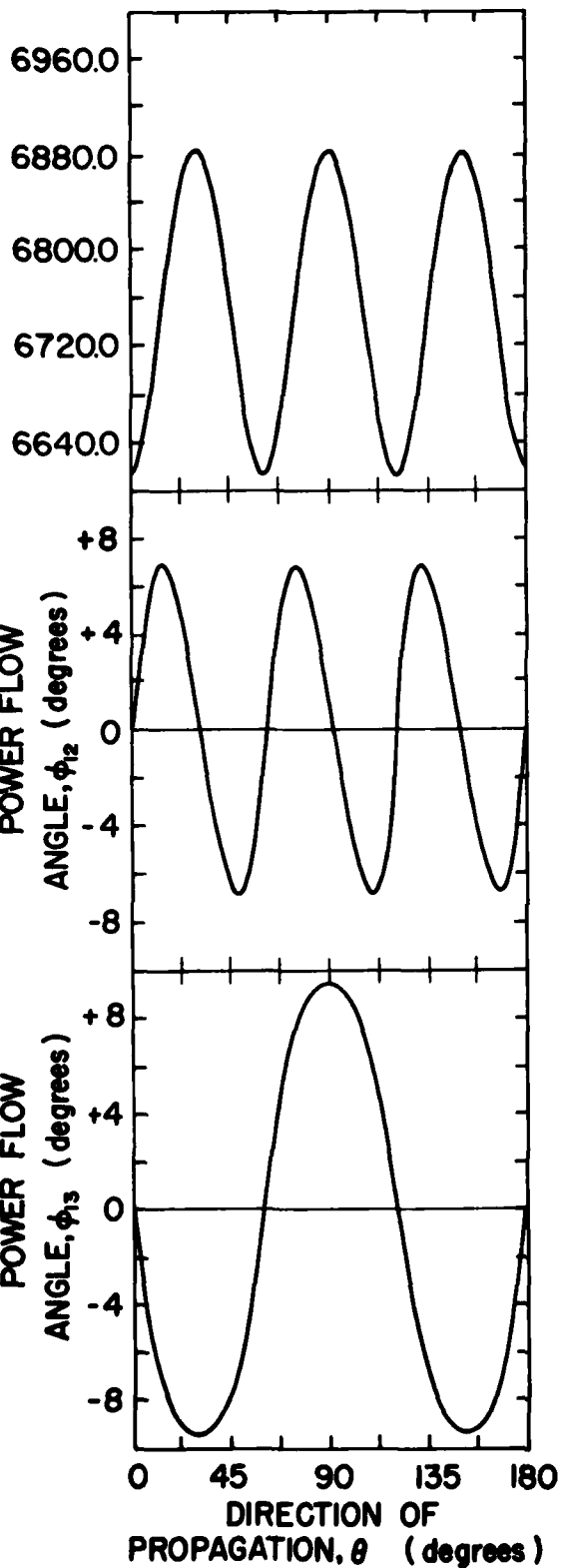




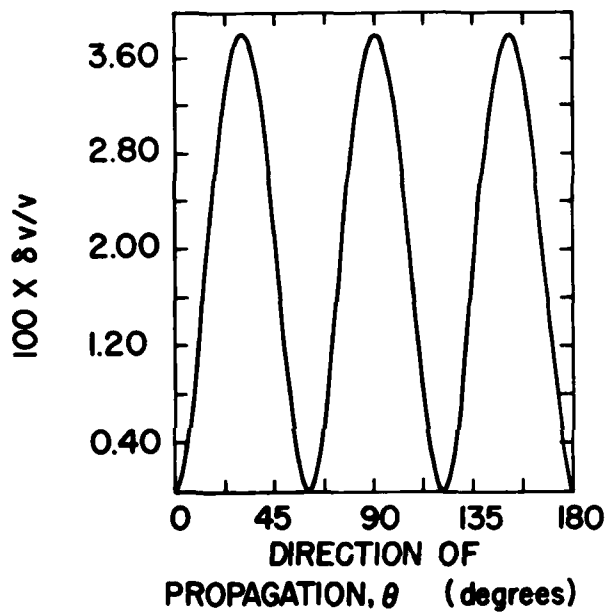
Y-PLANE
 LiNbO_3
(Smith and Welsh)

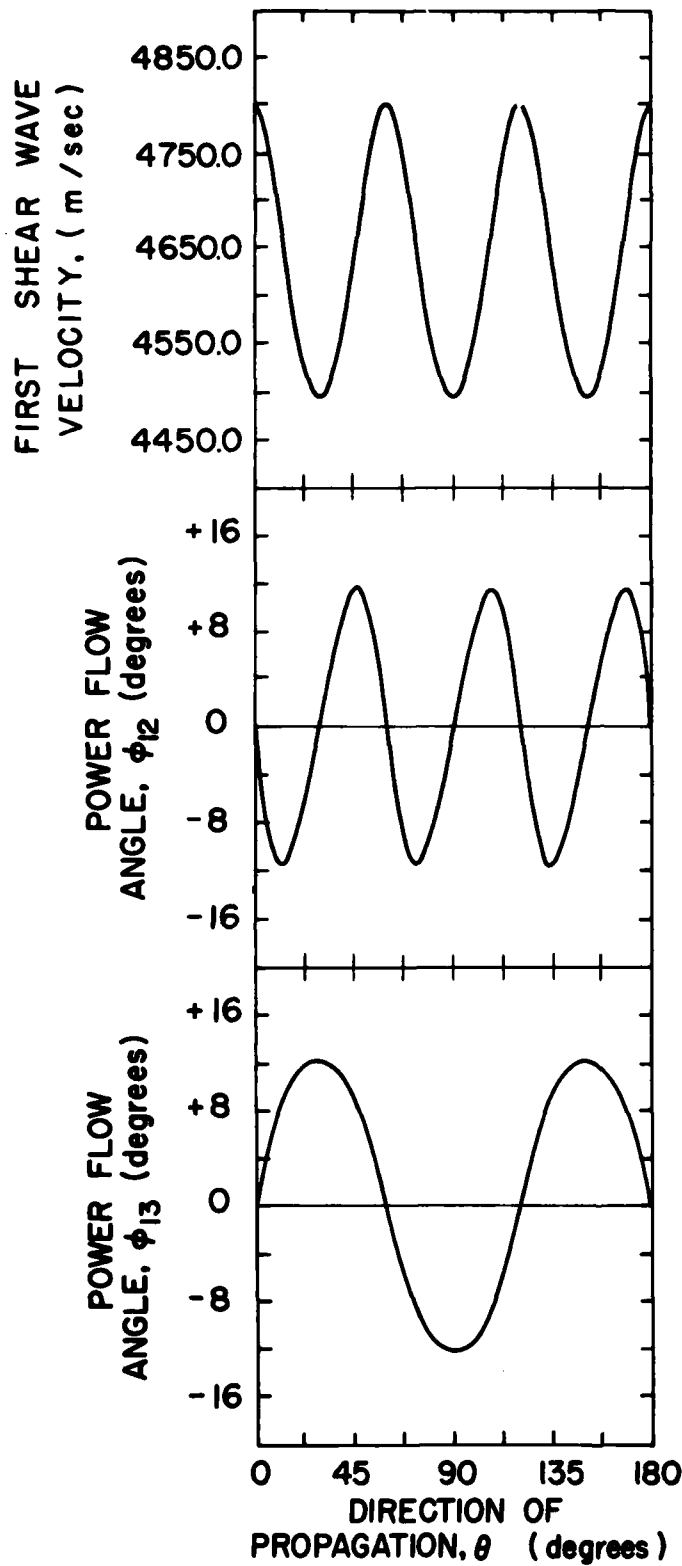


LONGITUDINAL WAVE
VELOCITY, (m / sec)

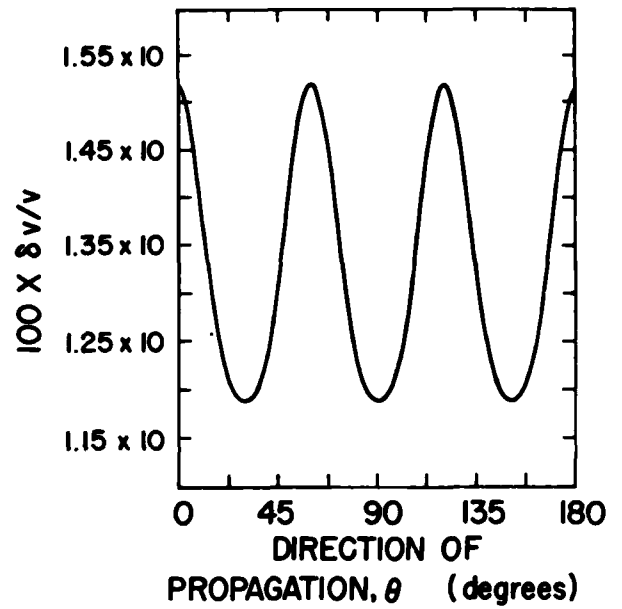


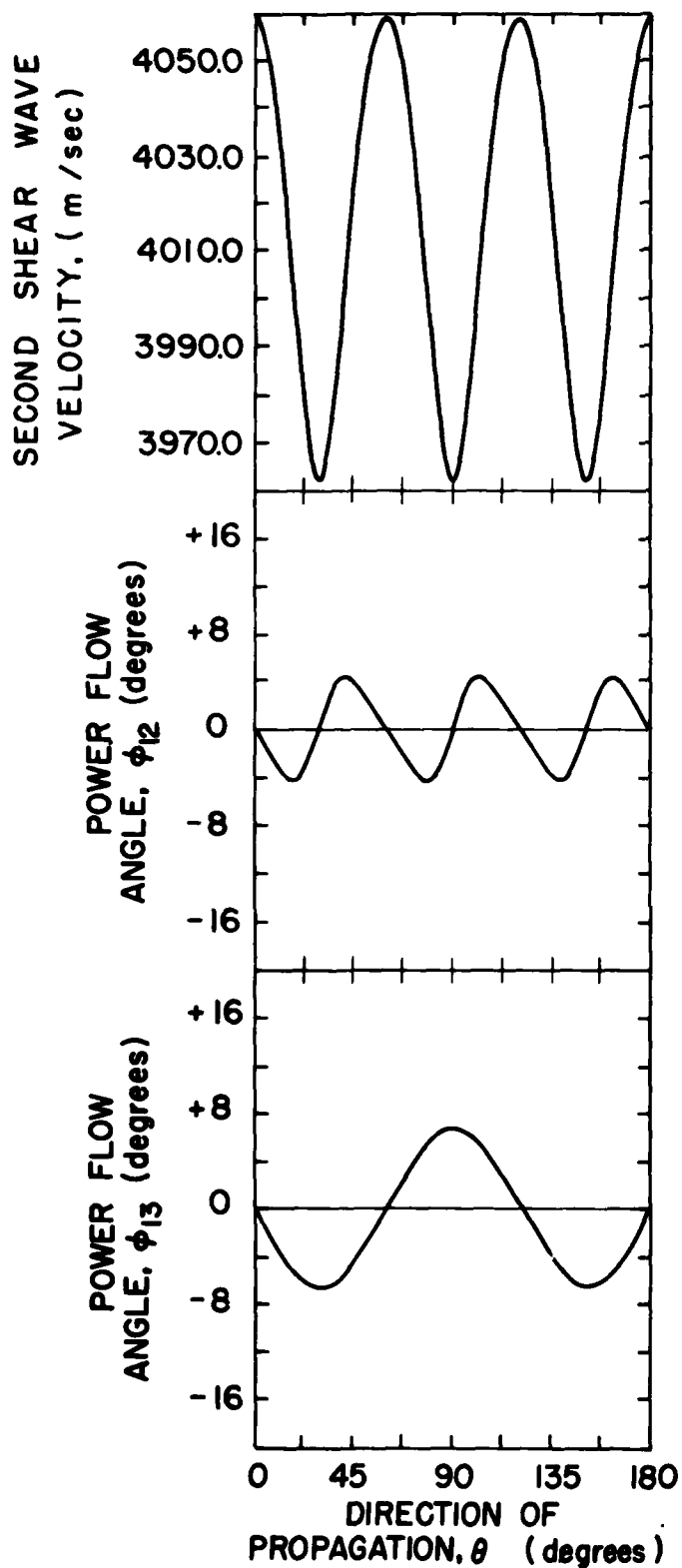
Z-PLANE
 LiNbO_3
(Smith and Welsh)



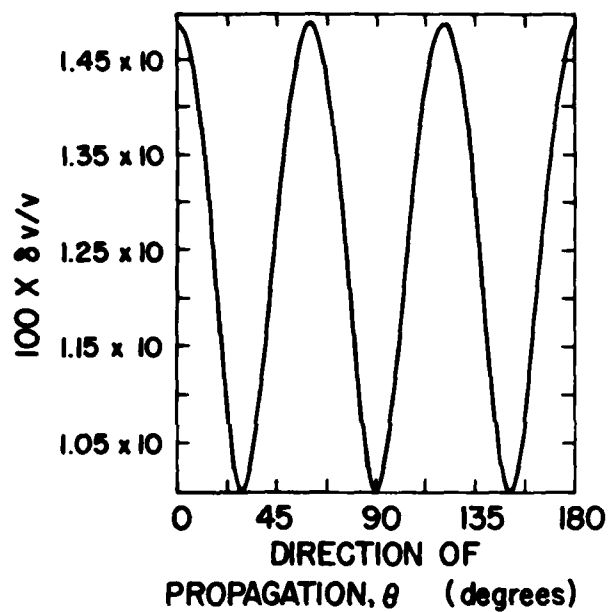


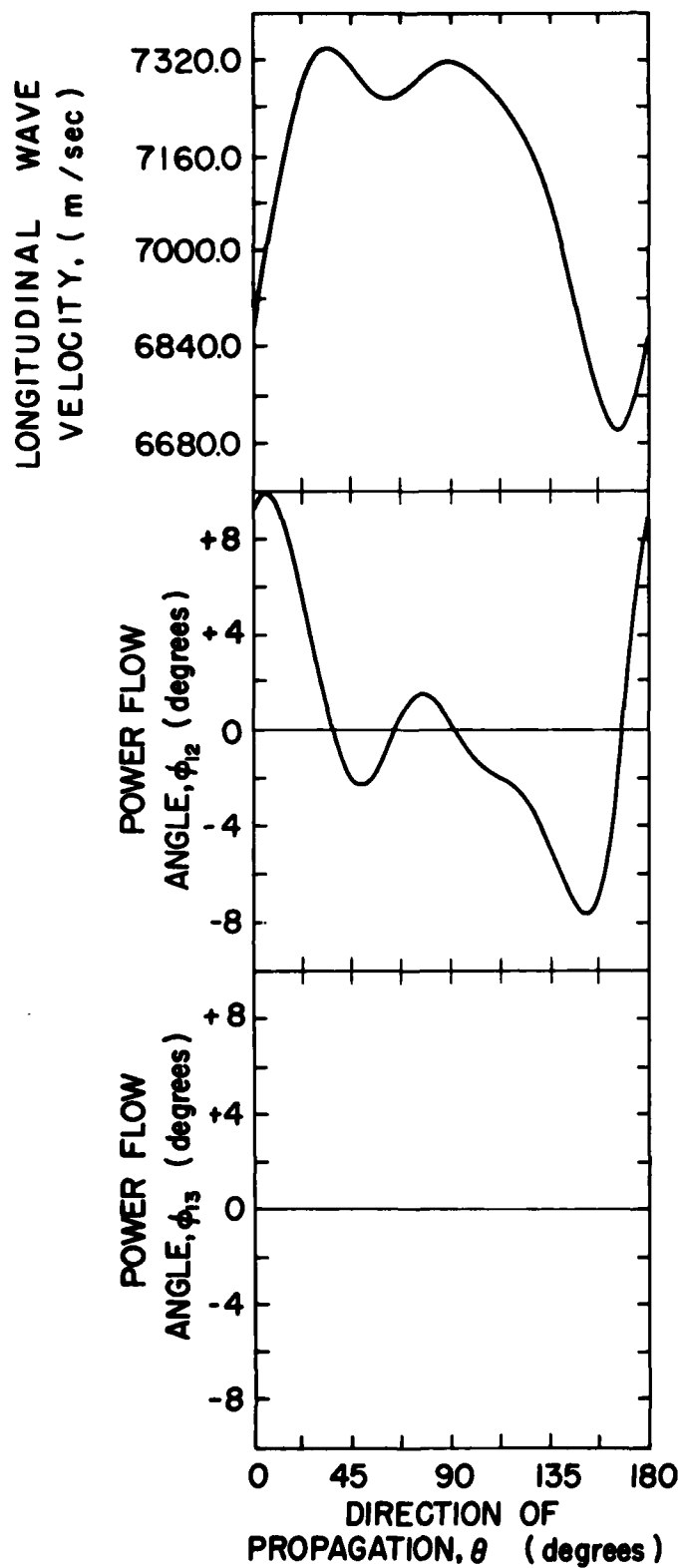
Z-PLANE
LiNbO₃
(Smith and Welsh)



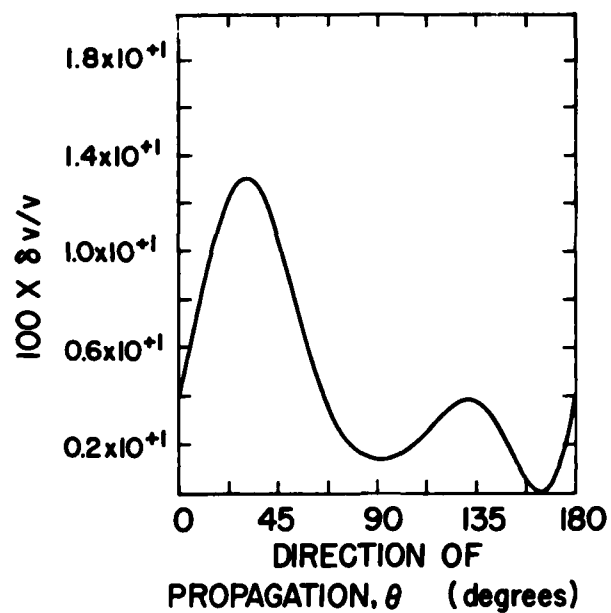


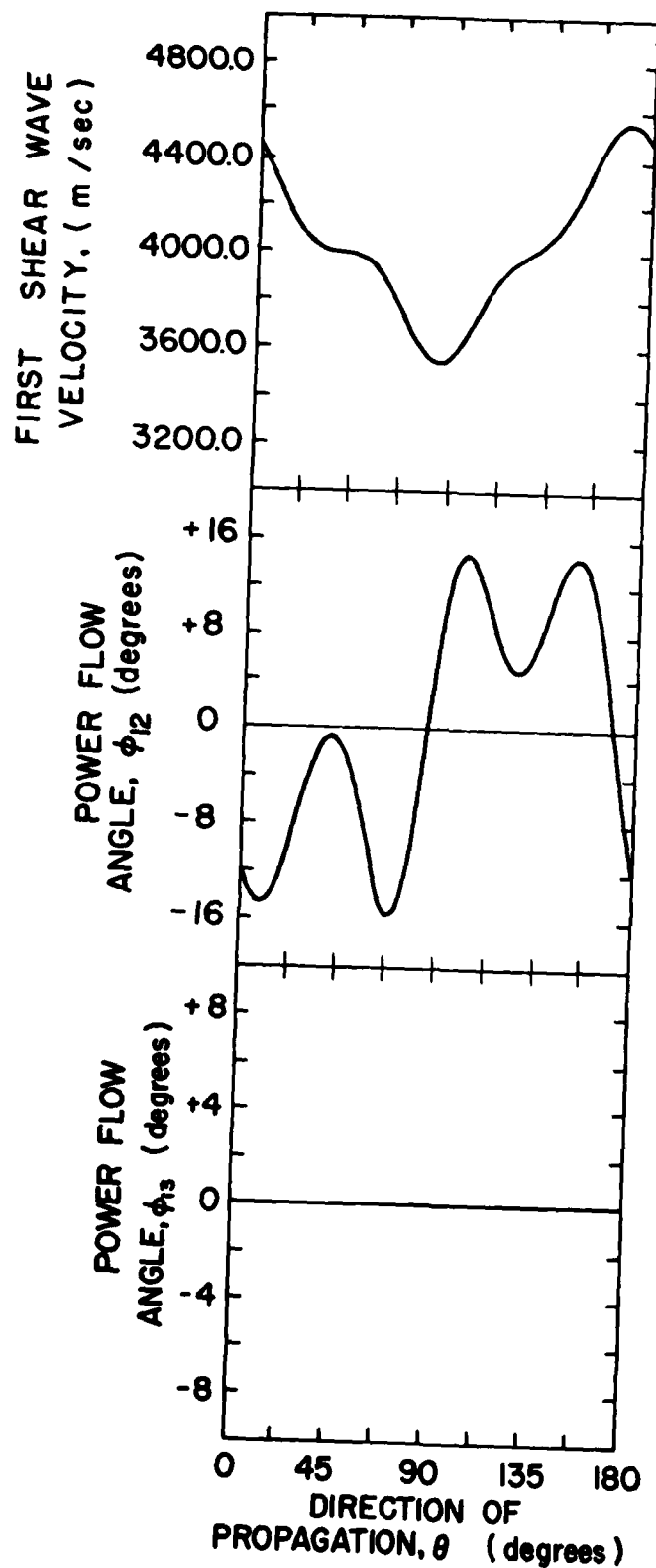
Z-PLANE
 LiNbO_3
(Smith and Welsh)



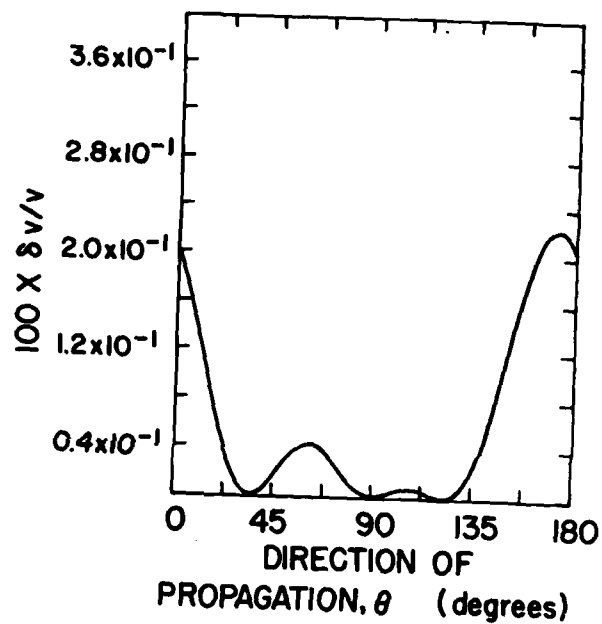


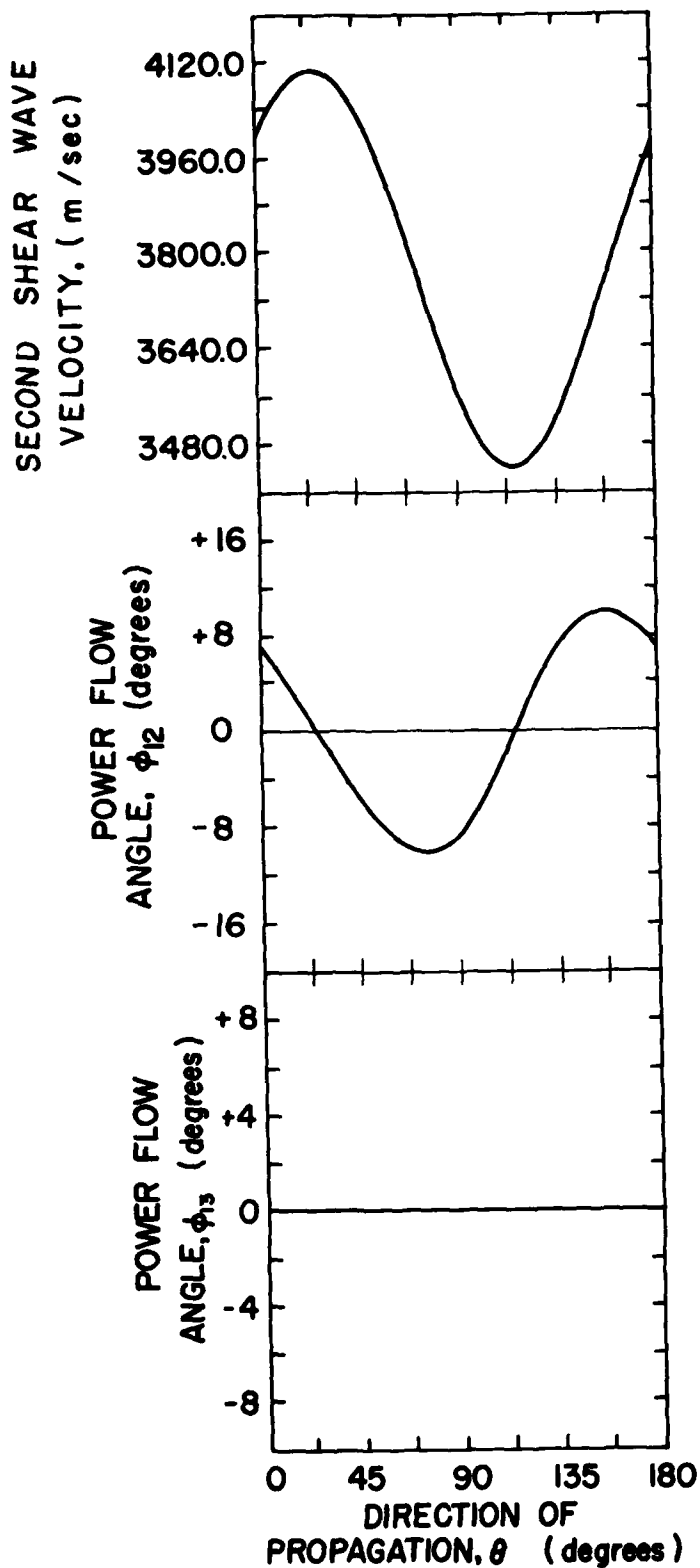
X-PLANE
 LiNbO_3
(Warner et al)



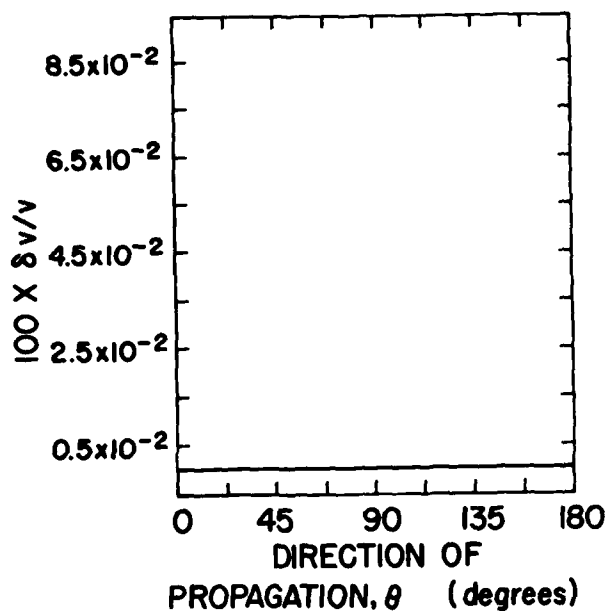


X-PLANE
 LiNbO_3
(Warner et al)

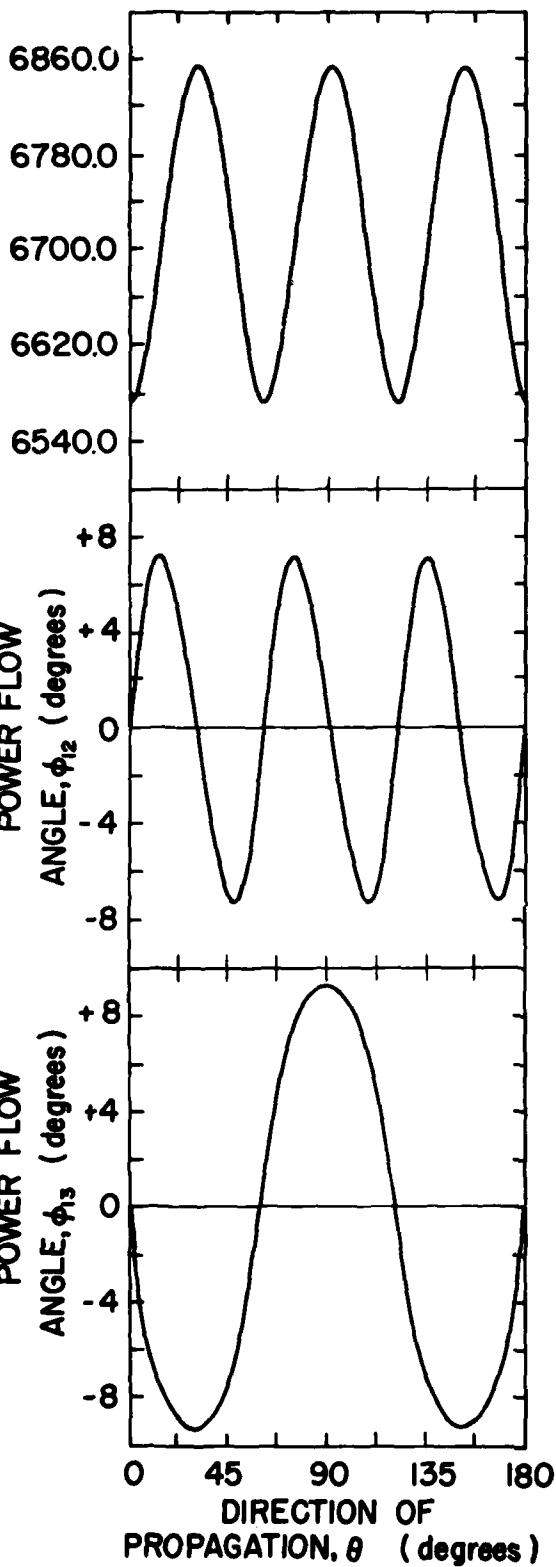




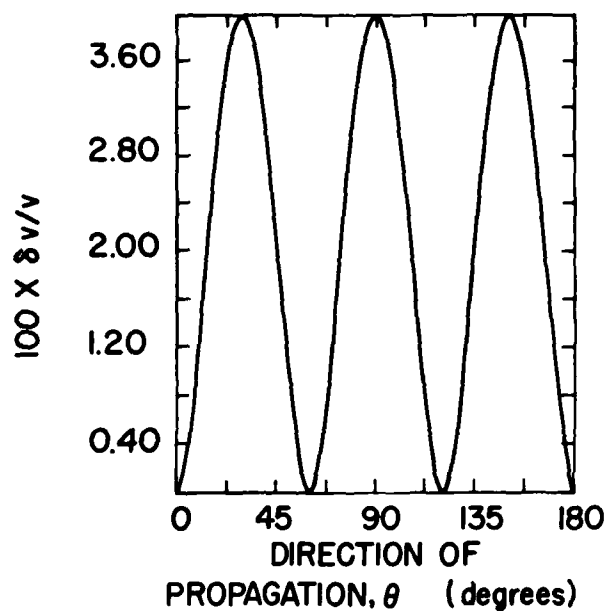
X-PLANE
 LiNbO_3
(Warner et al)

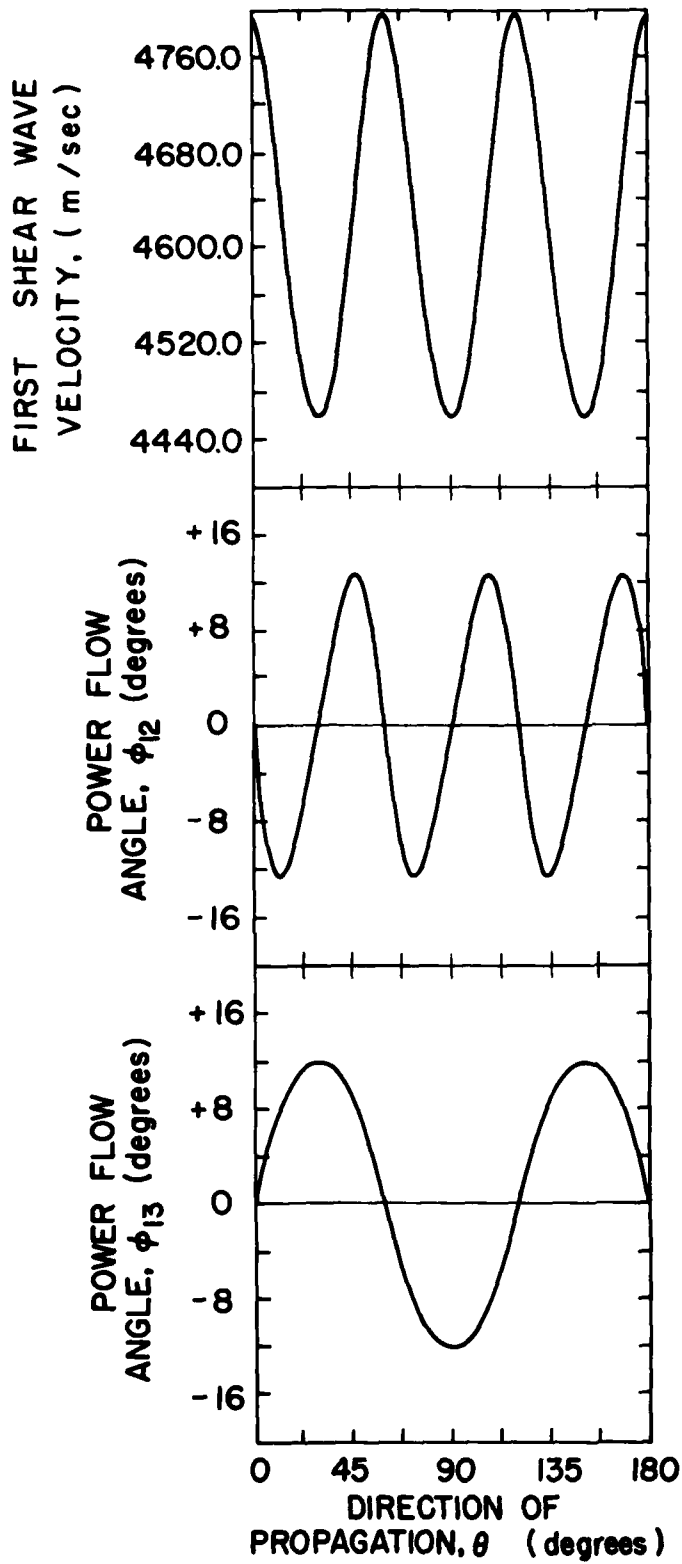


LONGITUDINAL WAVE
VELOCITY, (m / sec)

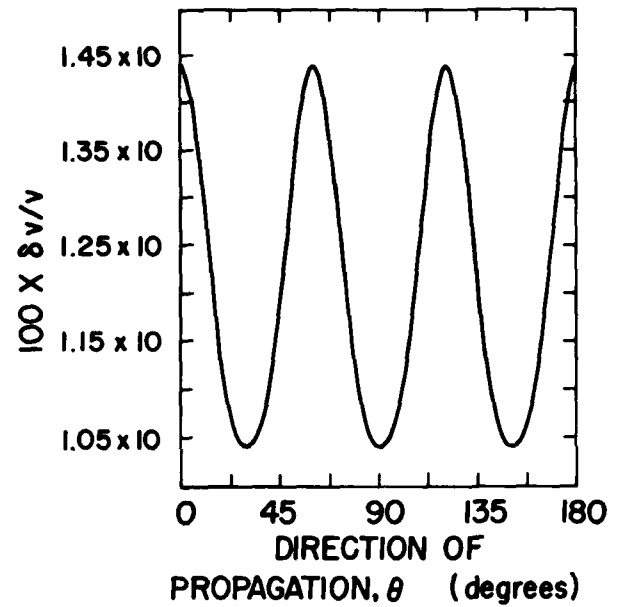


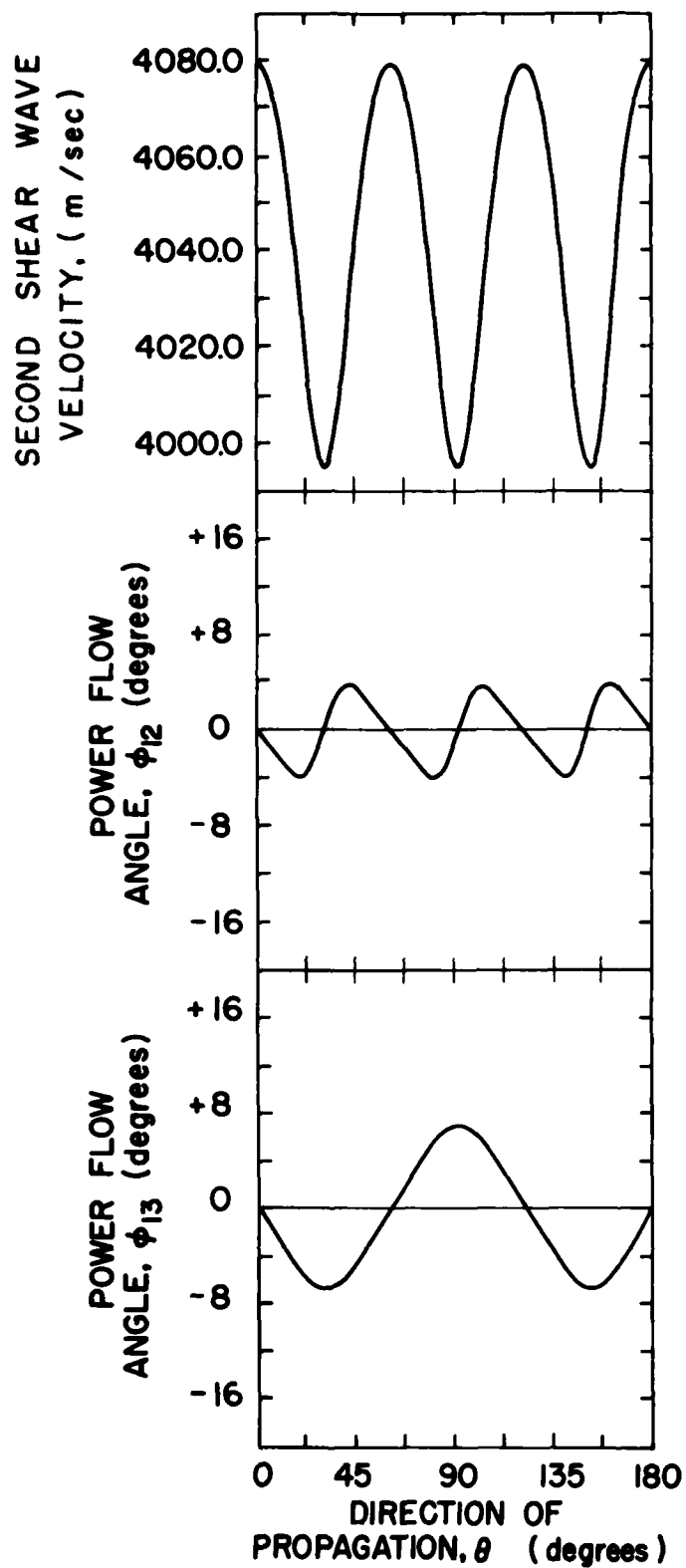
Z-PLANE
 LiNbO_3
(Warner et al)



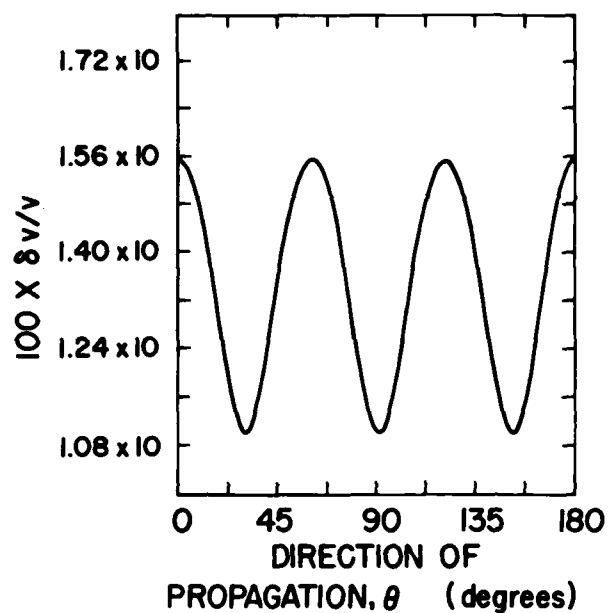


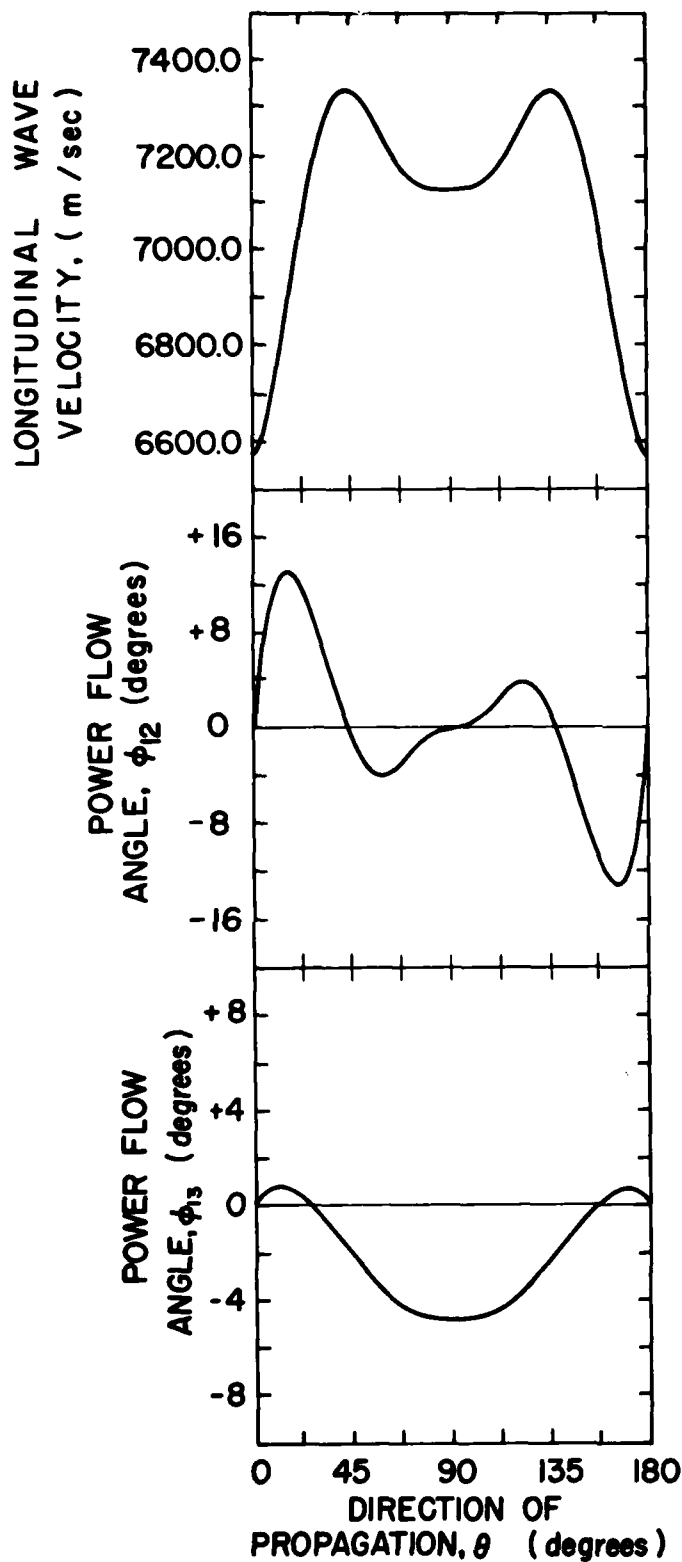
Z-PLANE
 LiNbO_3
(Warner et al)



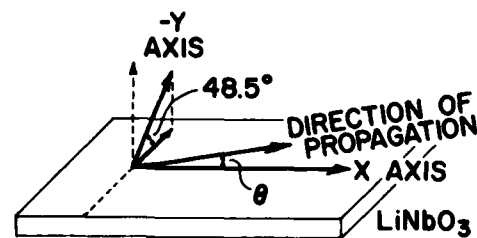
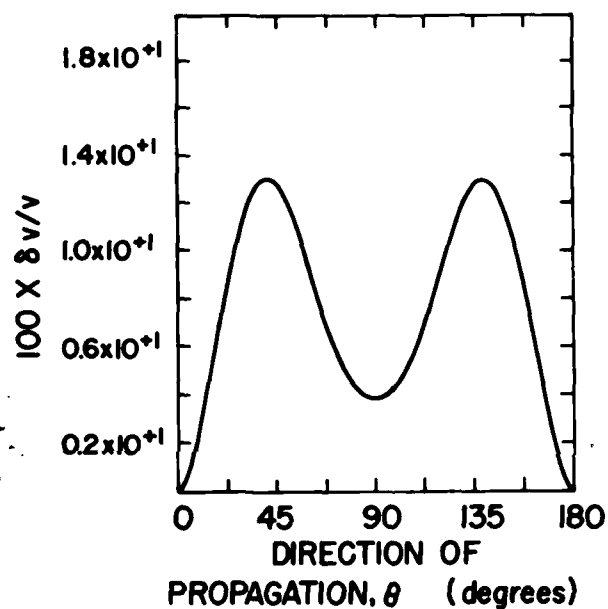


Z-PLANE
 LiNbO_3
(Warner et al)





X, 41.5-PLANE
 LiNbO_3
(Warner et al)



FIRST SHEAR WAVE
VELOCITY, (m/sec)

4720.0
4560.0
4400.0
4240.0
4080.0

POWER FLOW
ANGLE, ϕ_{12} (degrees)

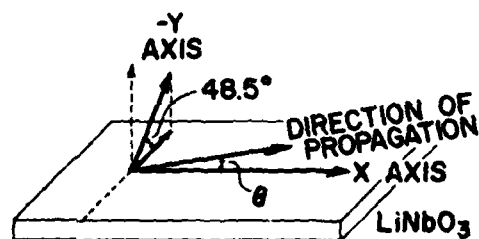
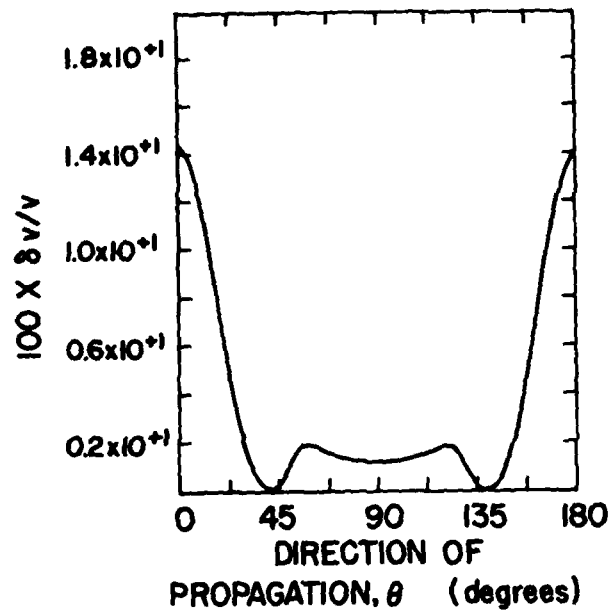
+16
+8
0
-8
-16

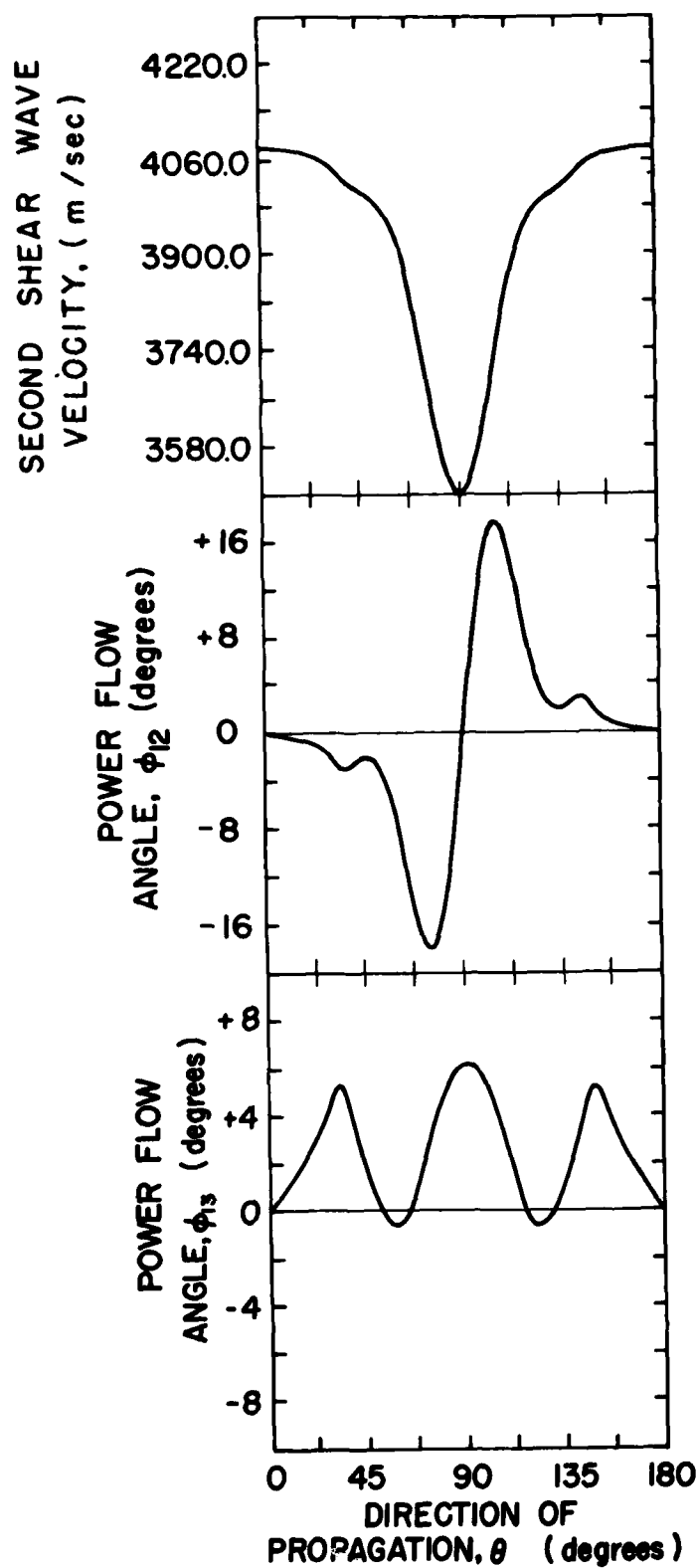
POWER FLOW
ANGLE, ϕ_{13} (degrees)

+8
+4
0
-4
-8

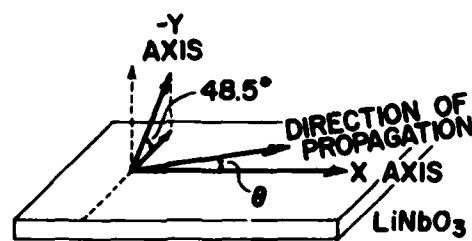
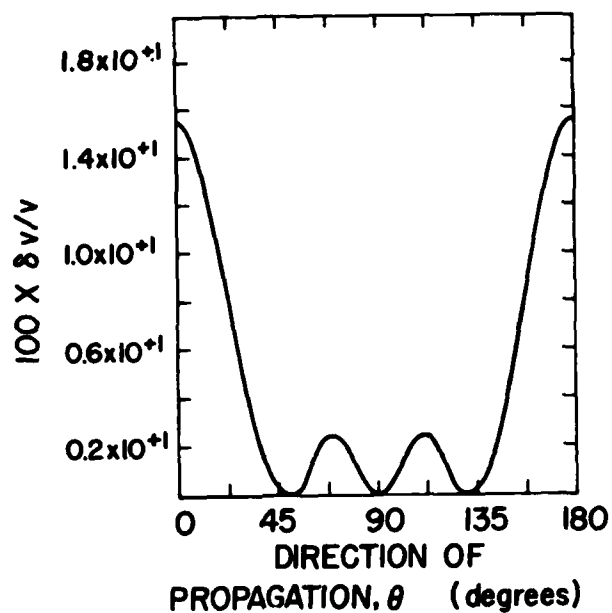
0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

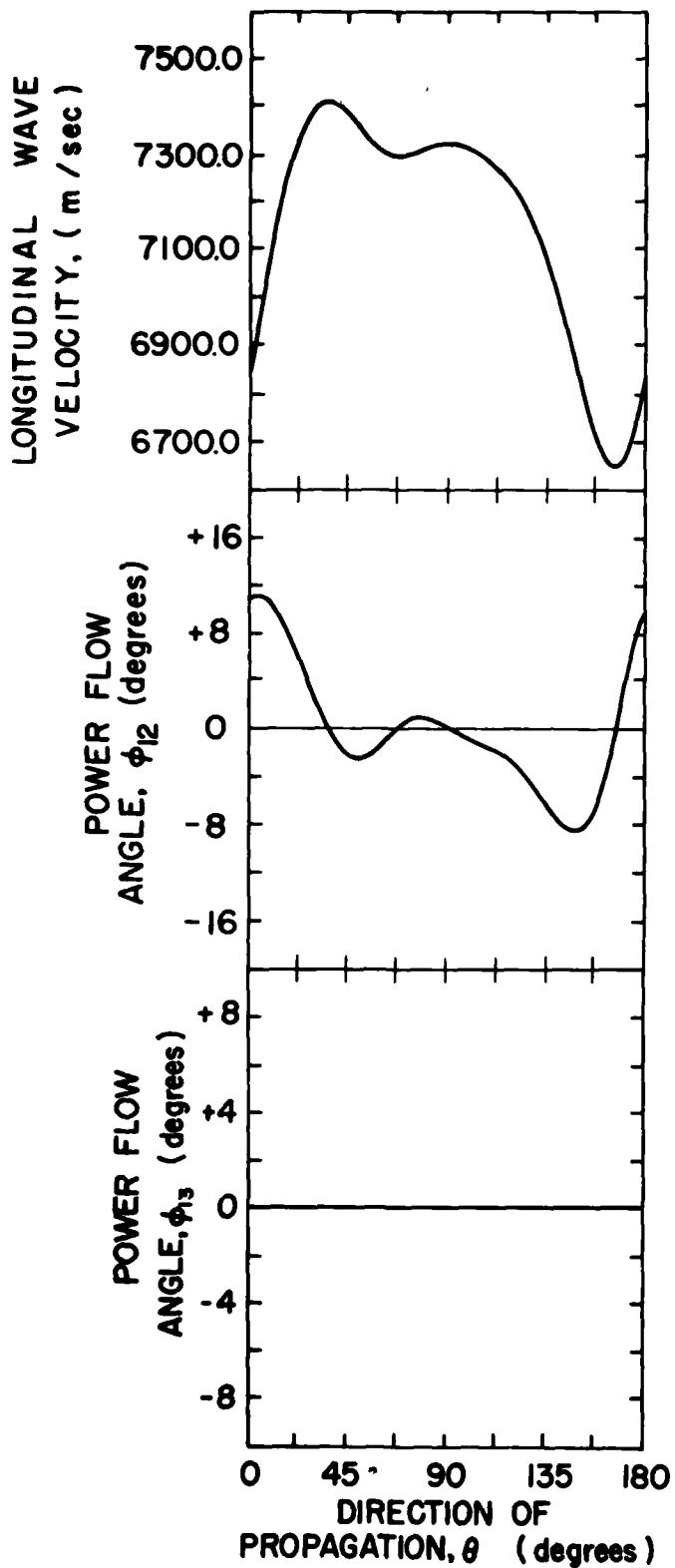
X, 41.5-PLANE
 LiNbO_3
(Warner et al)



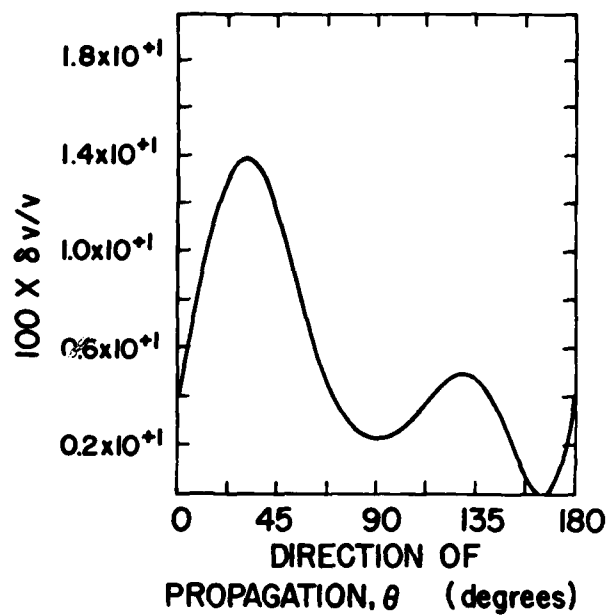


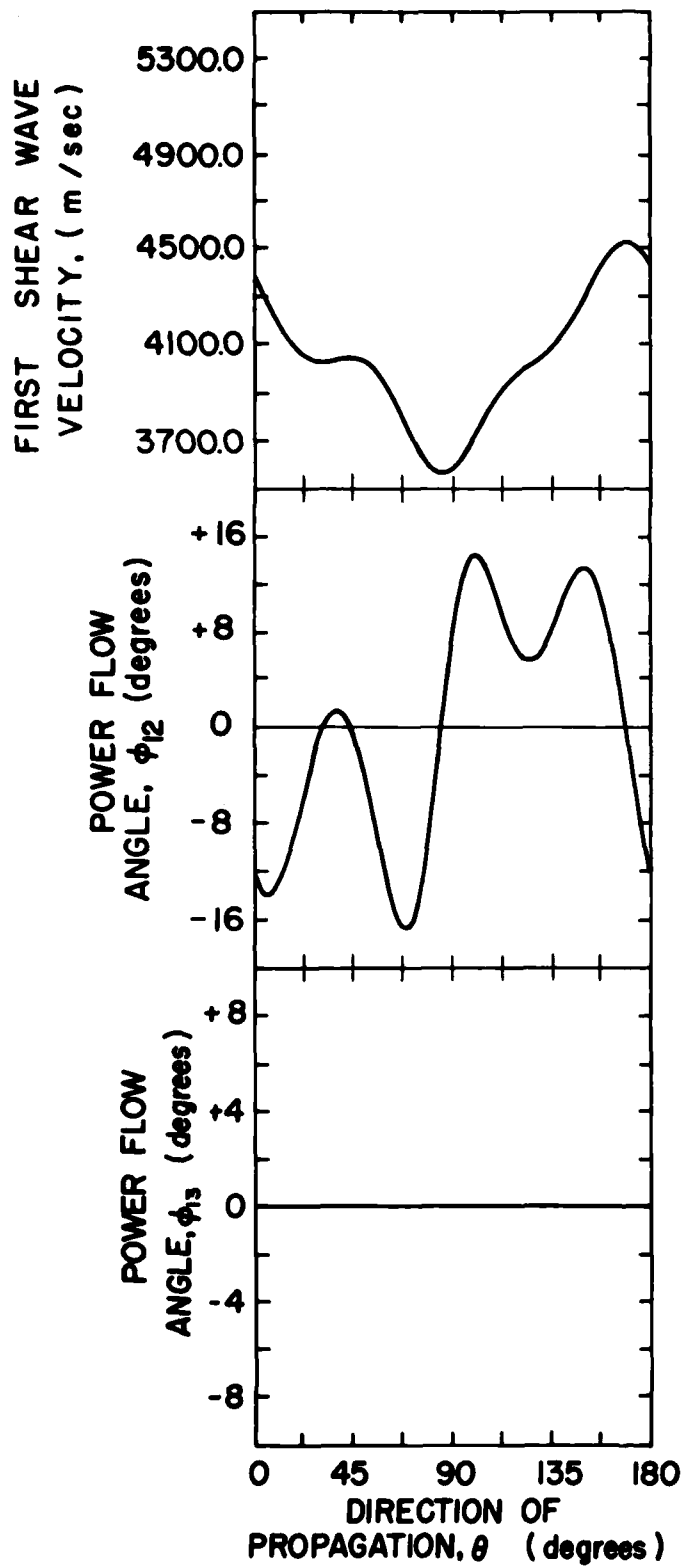
X, 41.5-PLANE
 LiNbO_3
(Warner et al)



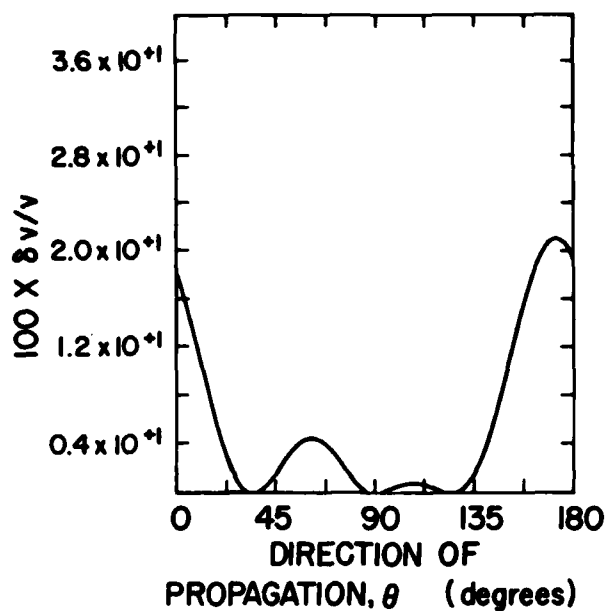


X-PLANE
 LiNbO_3
(Korolyuk et al)

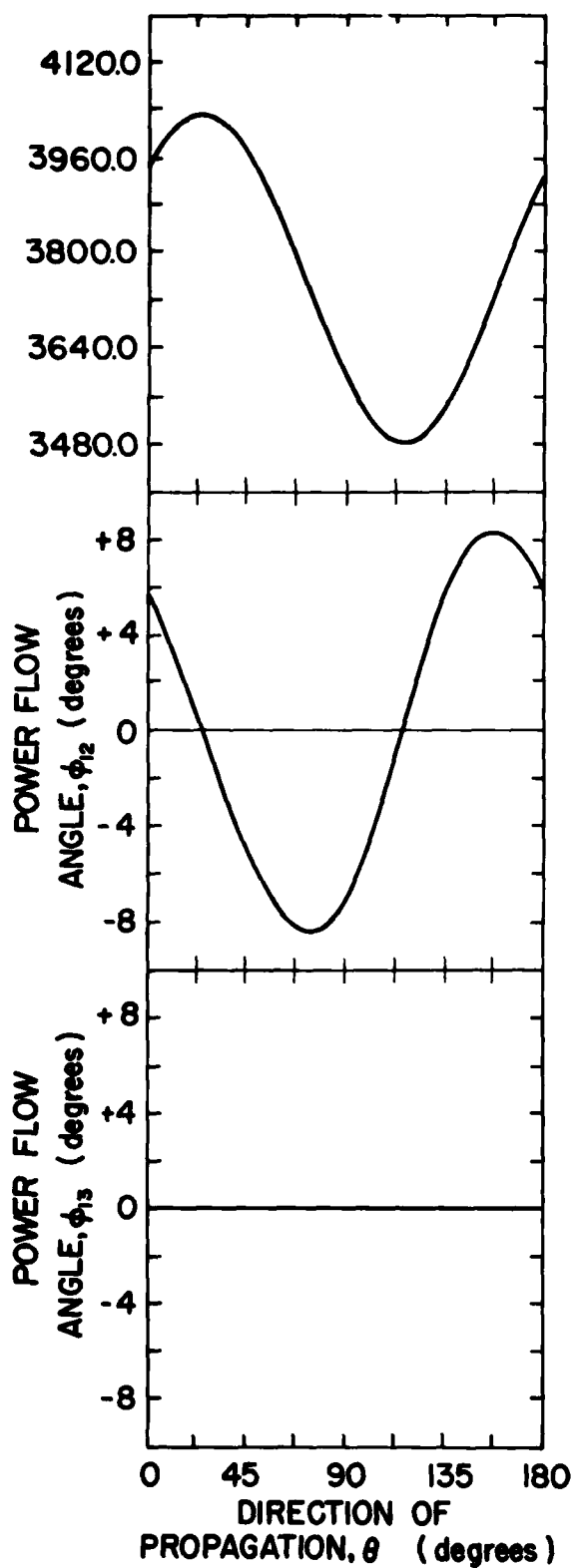




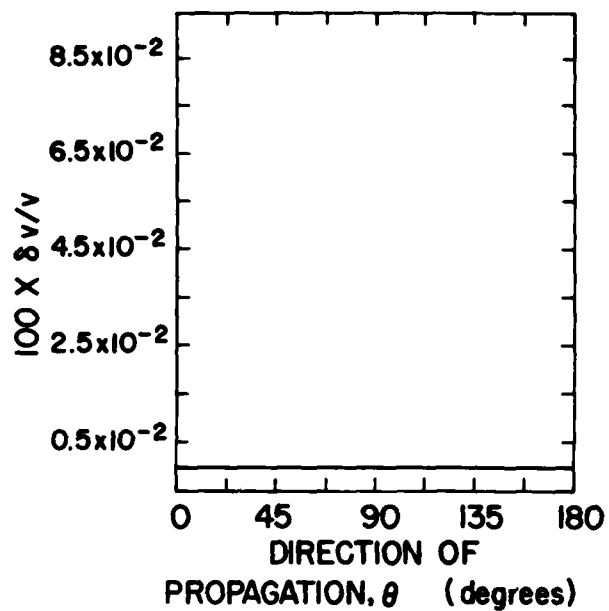
X-PLANE
 LiNbO_3
(Korolyuk et al)

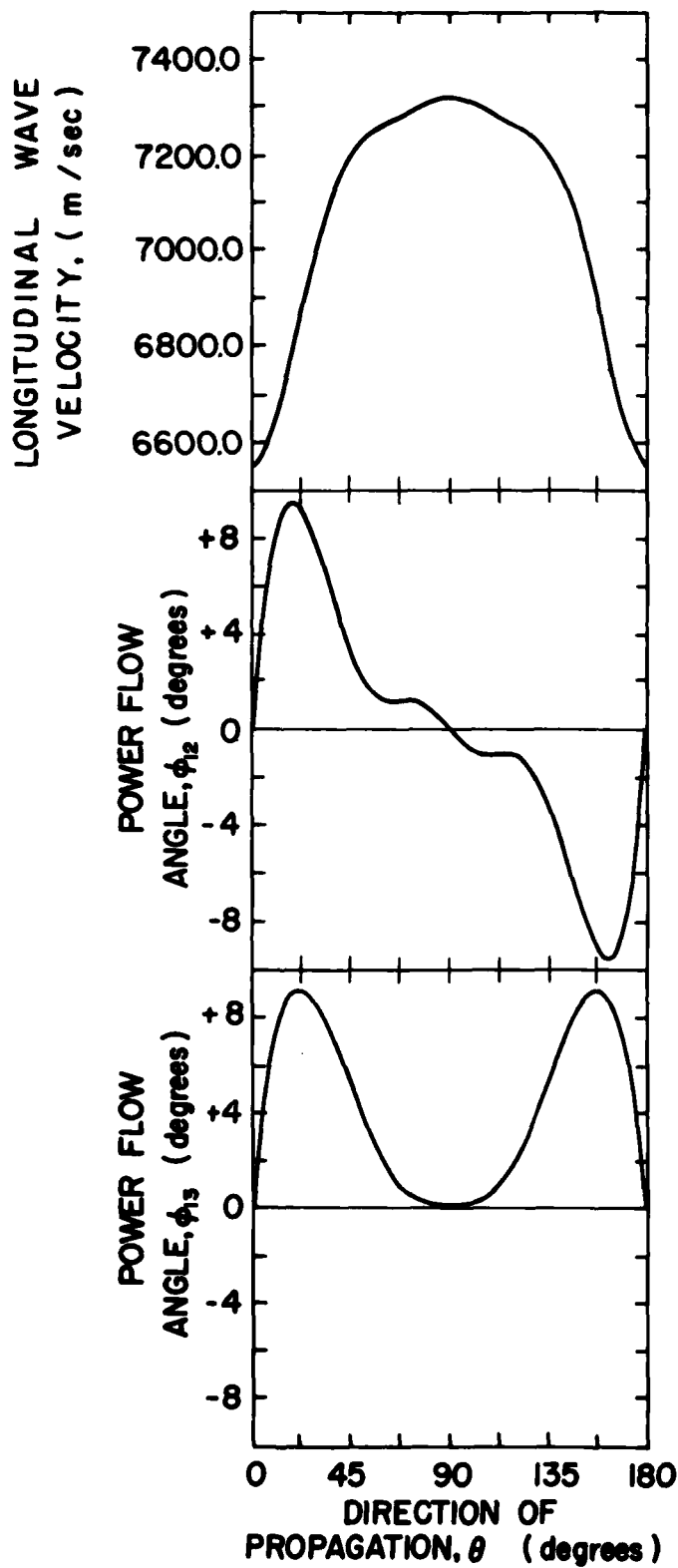


SECOND SHEAR WAVE
VELOCITY, (m/sec)

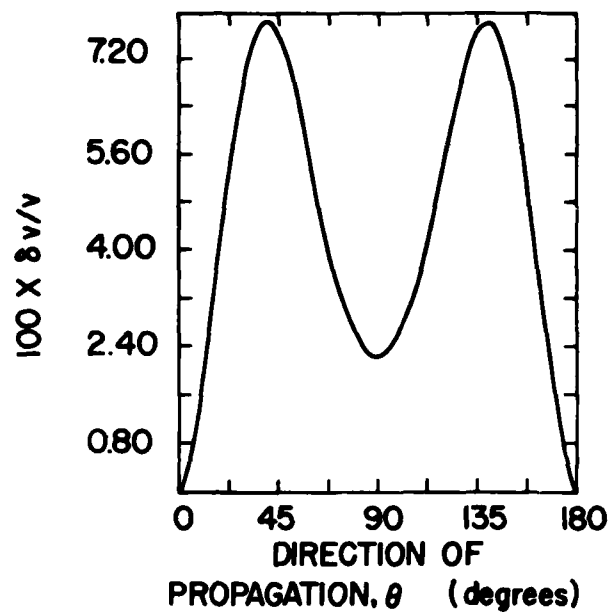


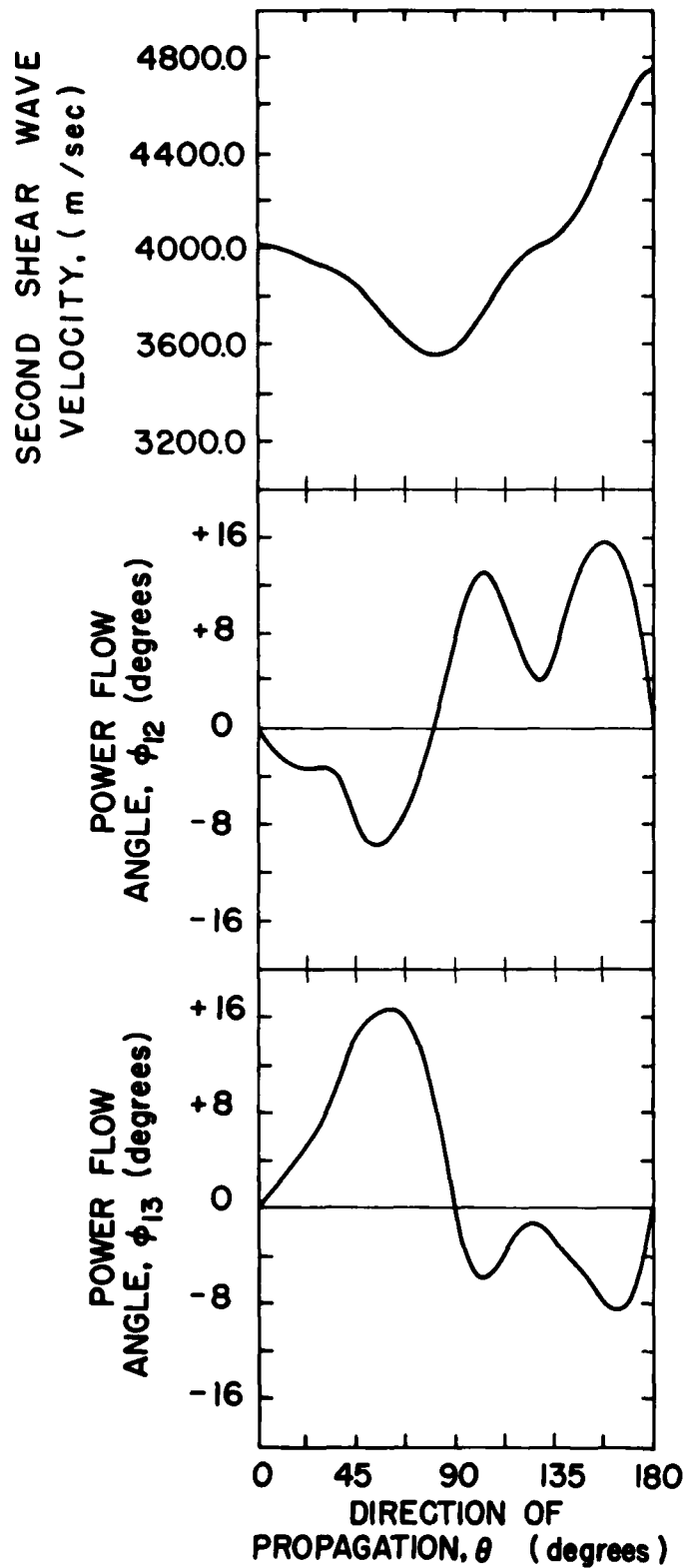
X-PLANE
 LiNbO_3
(Korolyuk et al)



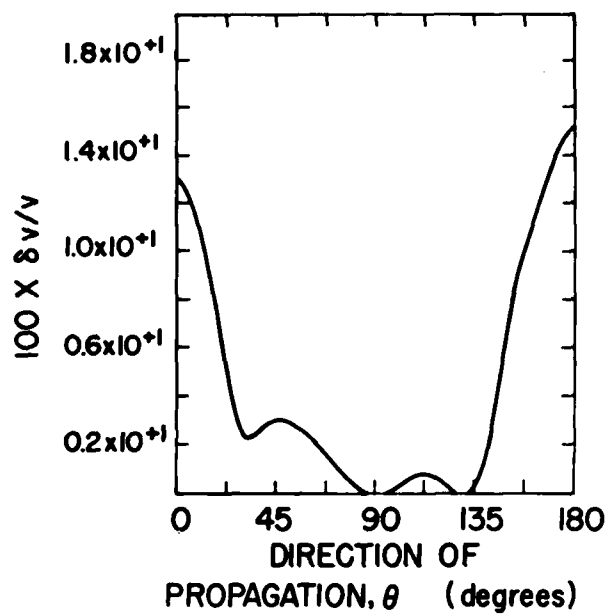


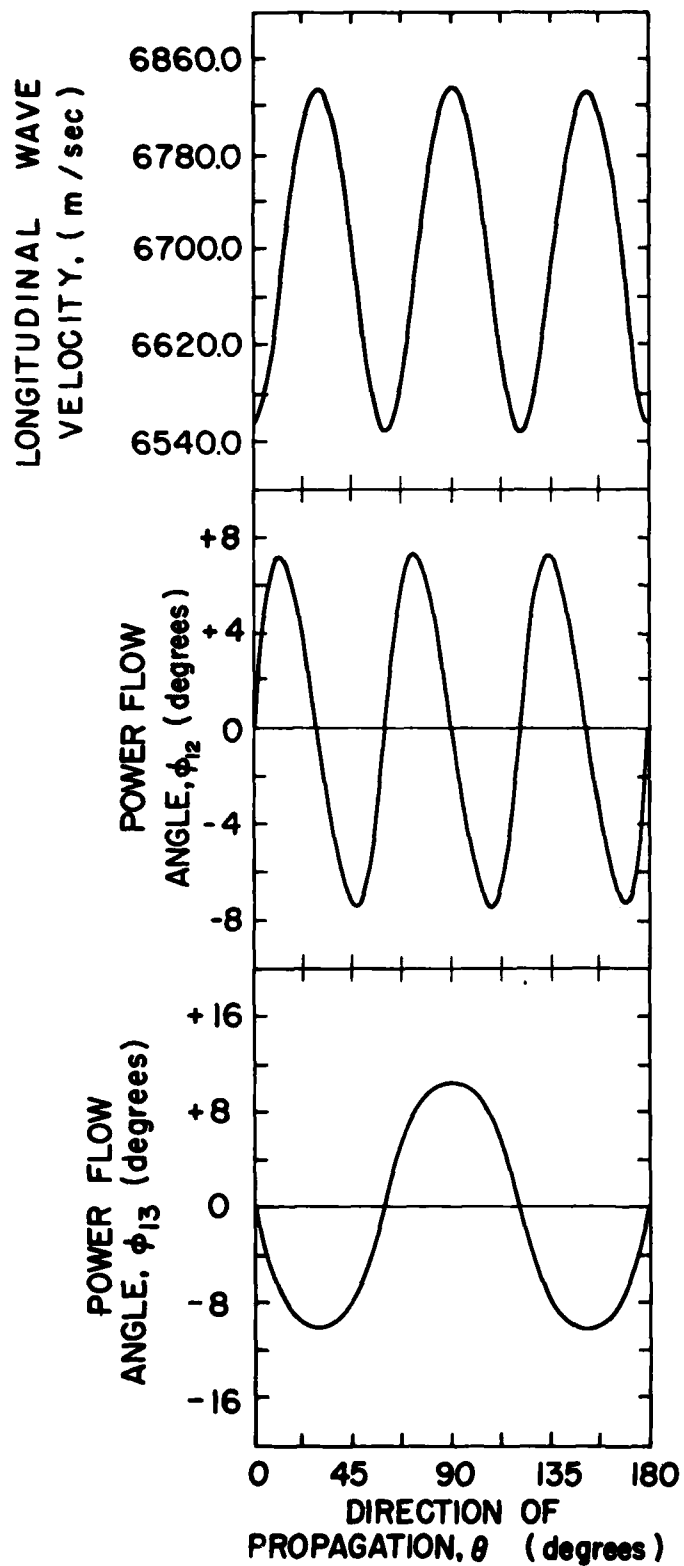
Y-PLANE
 LiNbO_3
(Korolyuk et al)



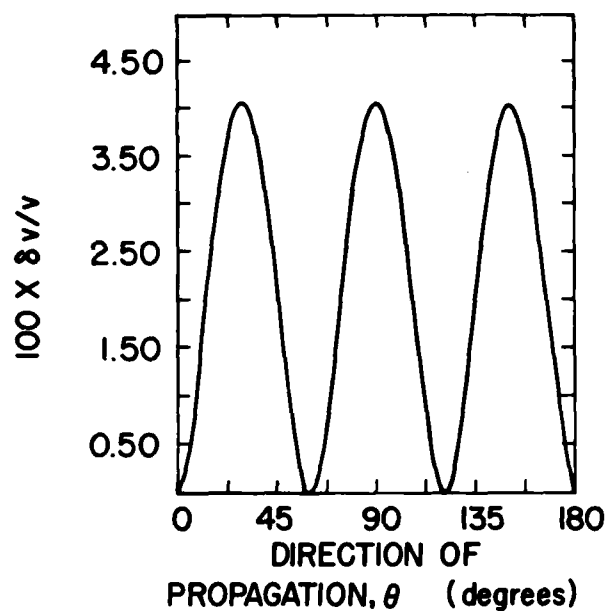


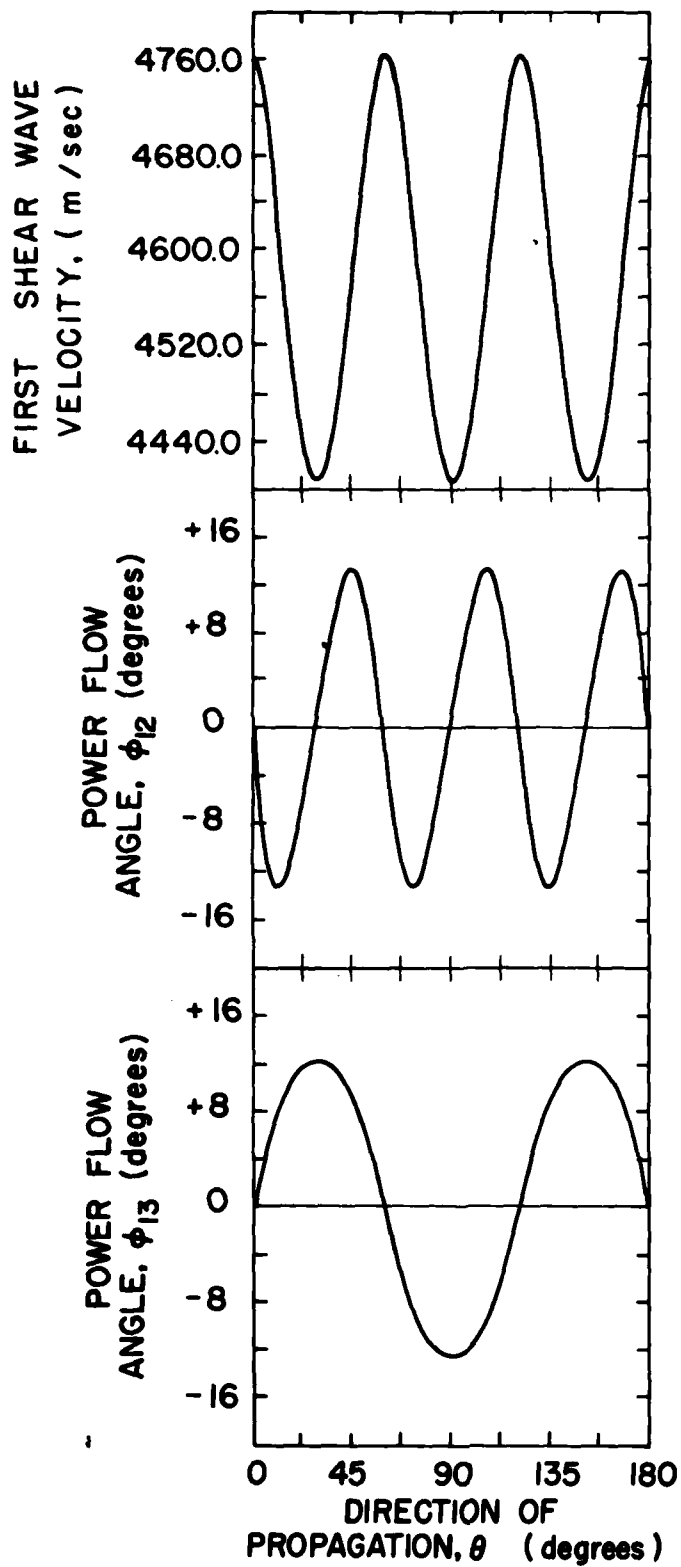
Y-PLANE
 LiNbO_3
(Korolyuk et al)



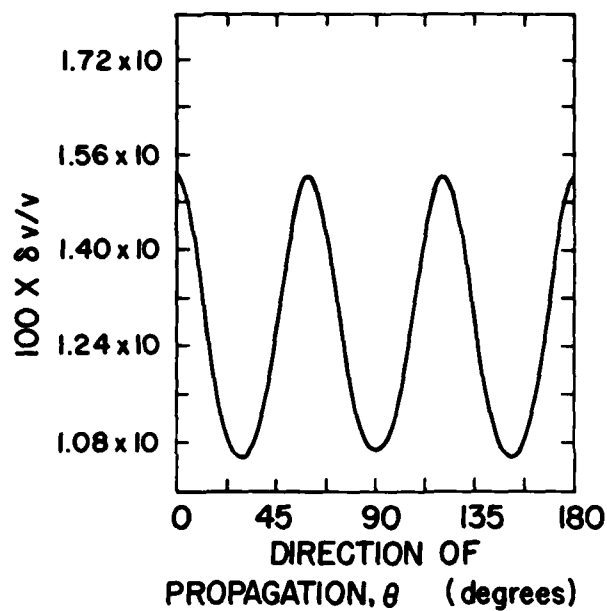


Z-PLANE
 LiNbO_3
(Korolyuk et al)

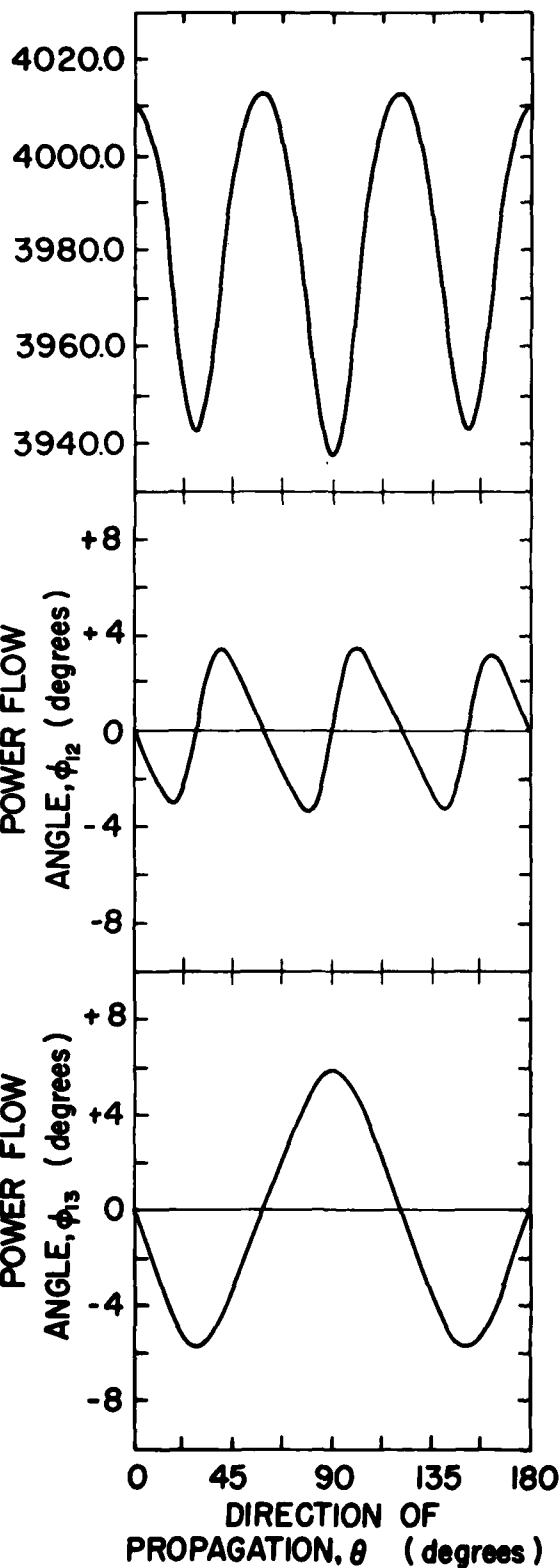




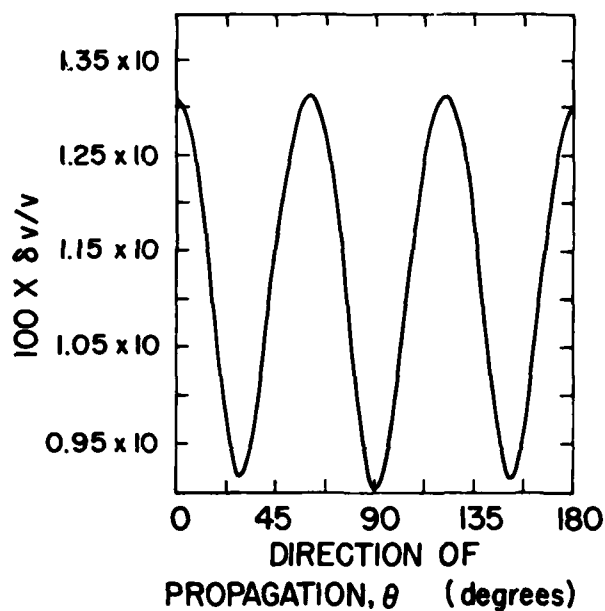
Z-PLANE
 LiNbO_3
(Korolyuk et al)

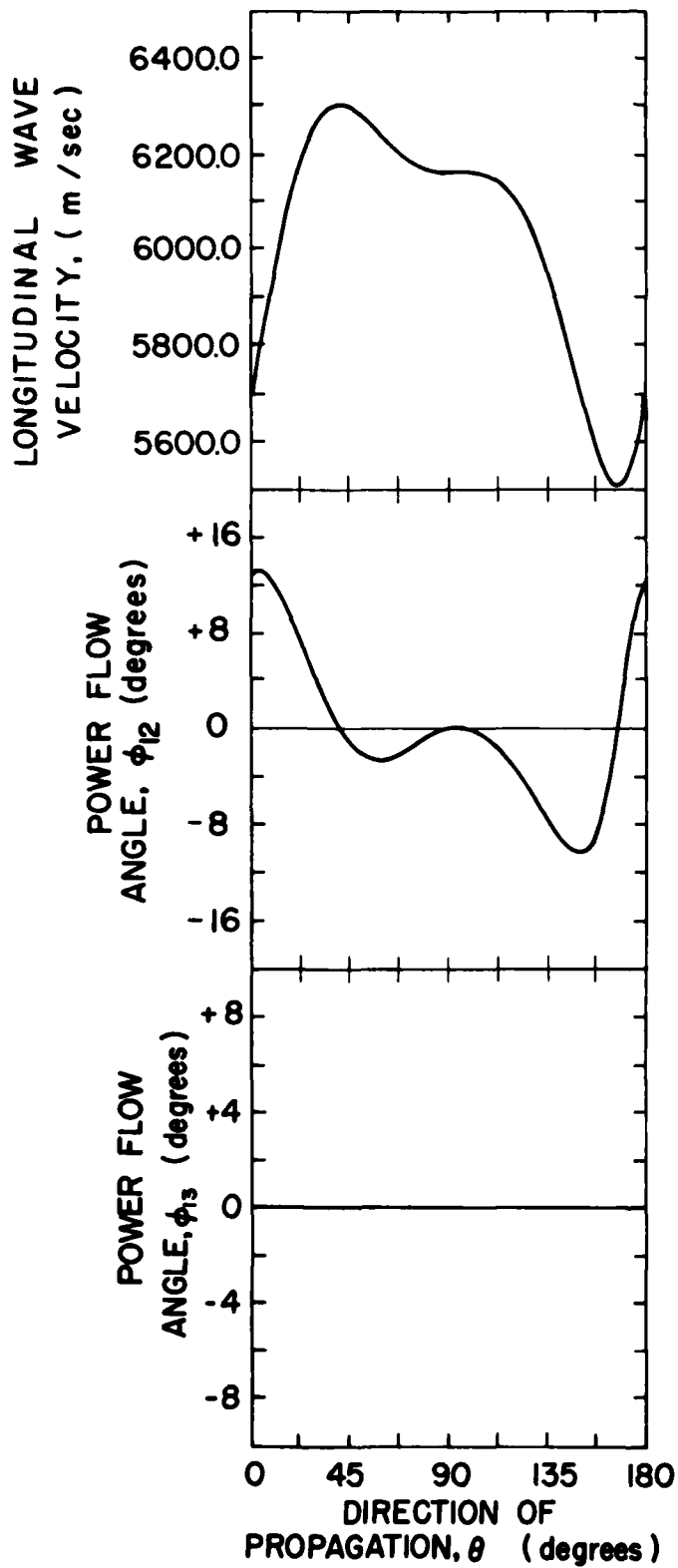


SECOND SHEAR WAVE
VELOCITY, (m /sec)

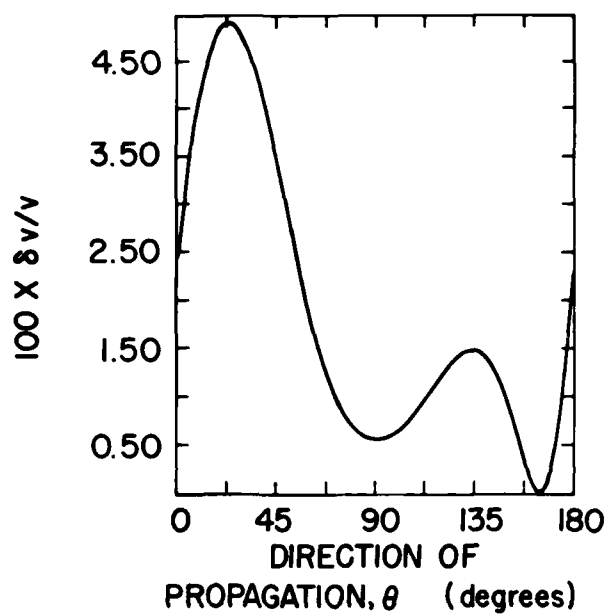


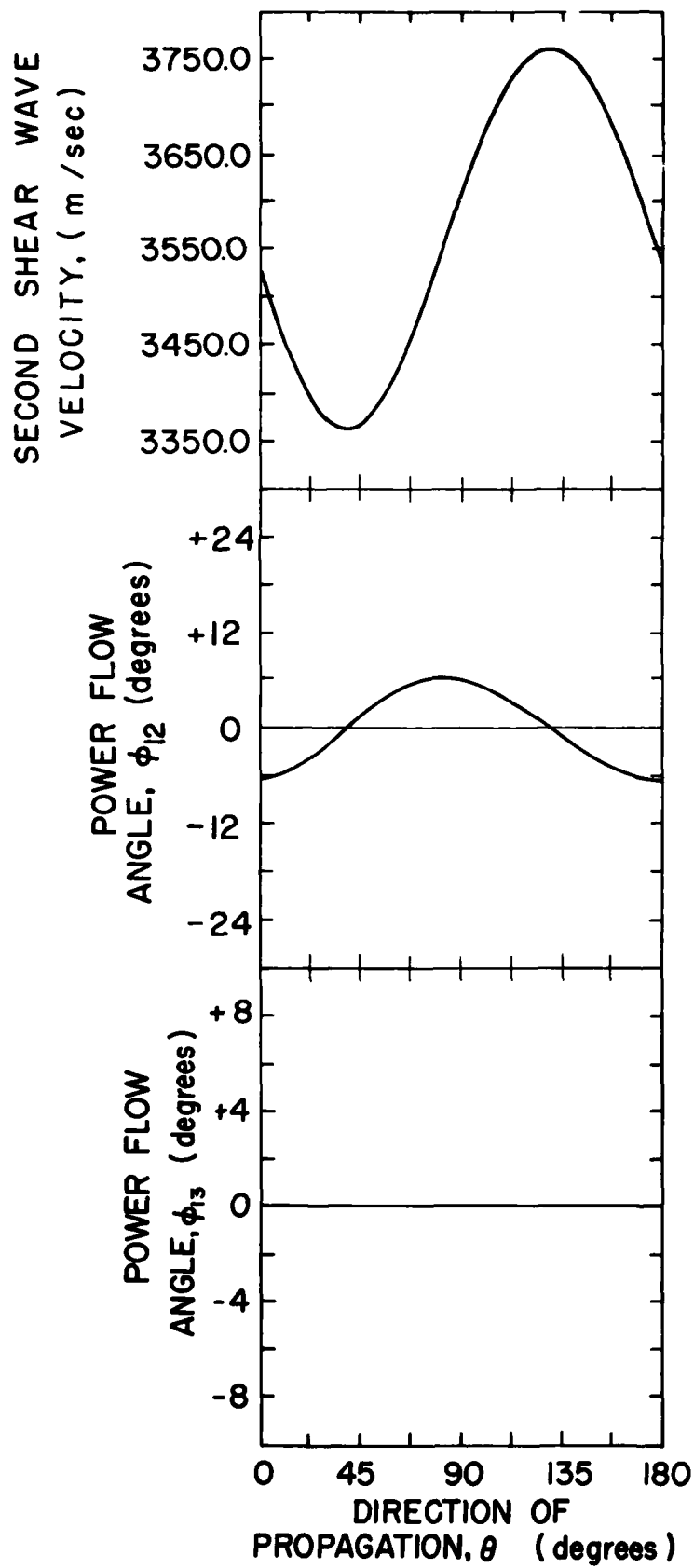
Z-PLANE
 LiNbO_3
(Korolyuk et al)



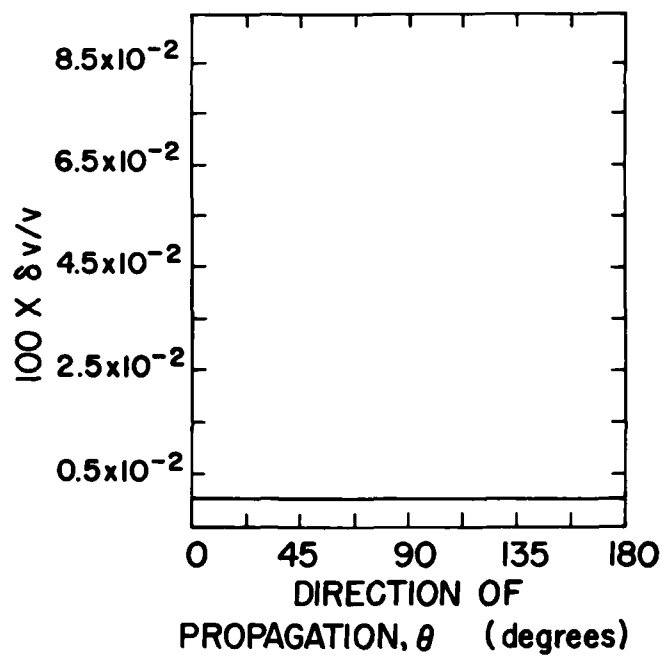


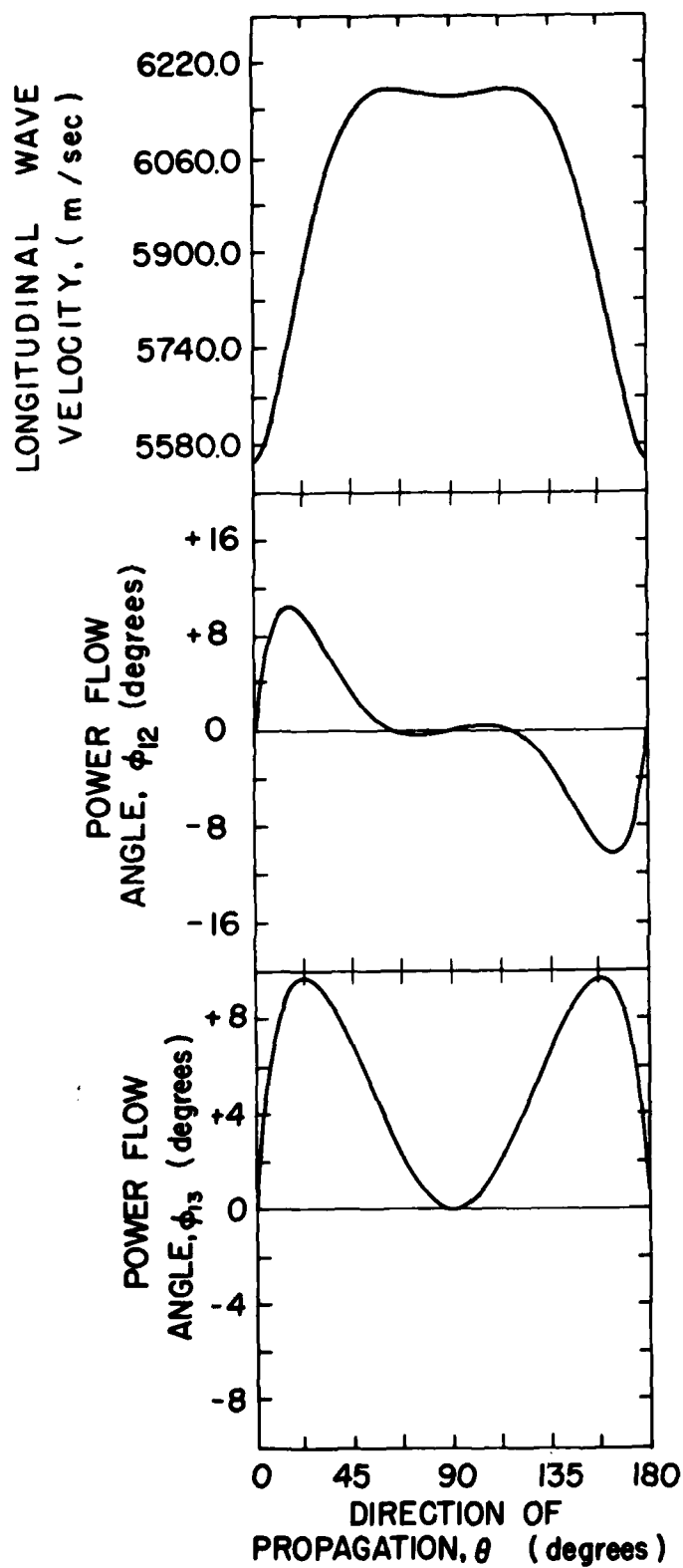
X-PLANE
 LiTaO_3
(Smith and Welsh)



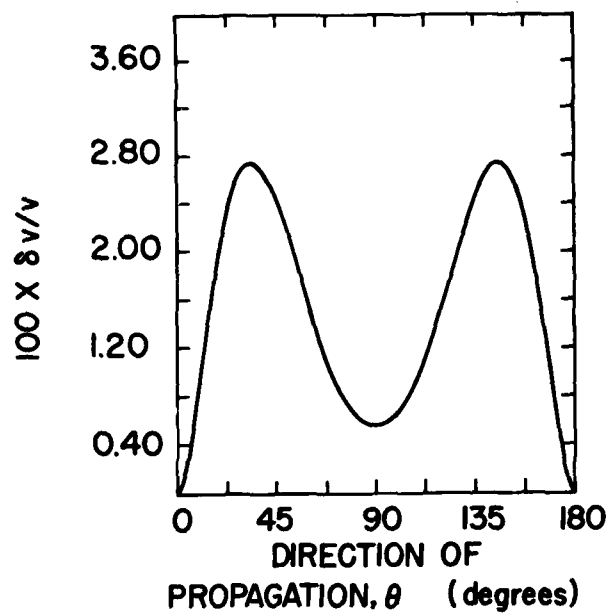


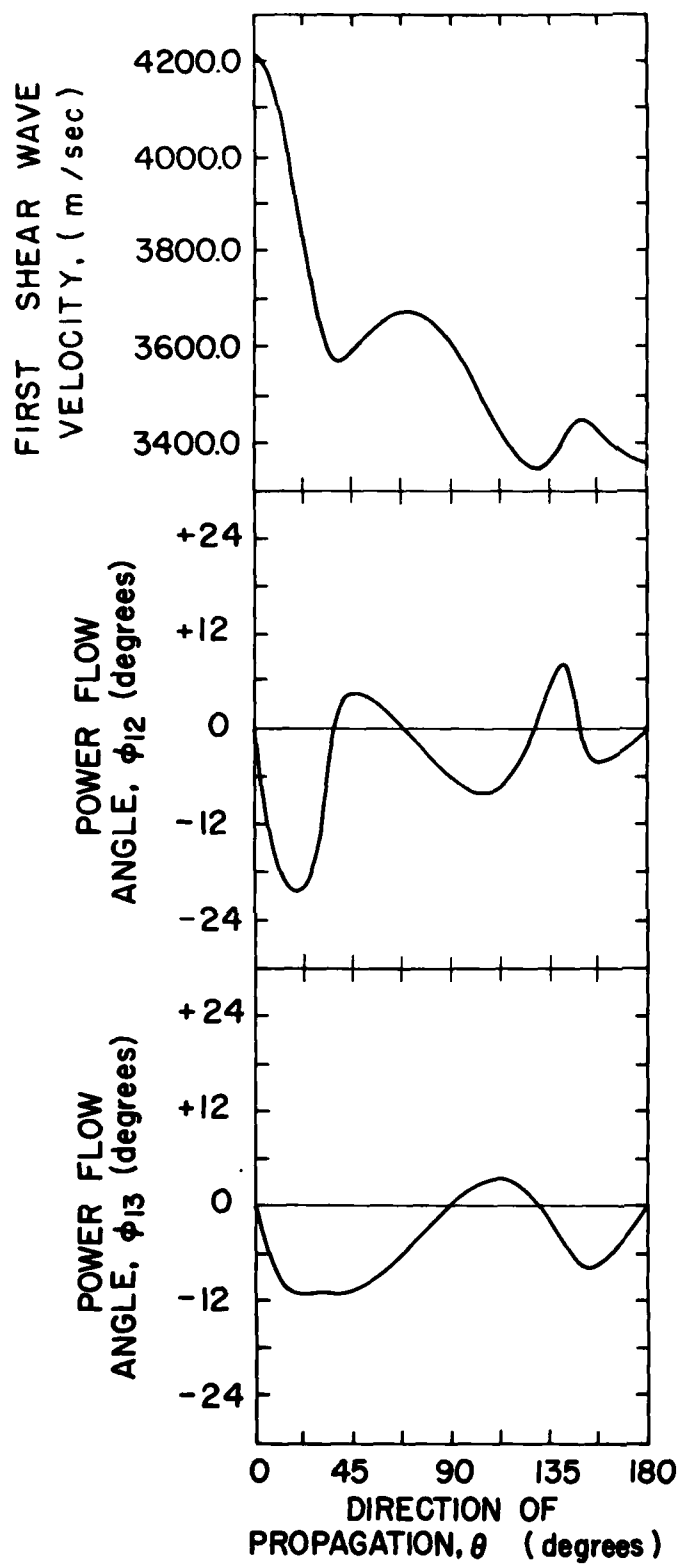
X-PLANE
 LiTaO_3
(Smith and Welsh)



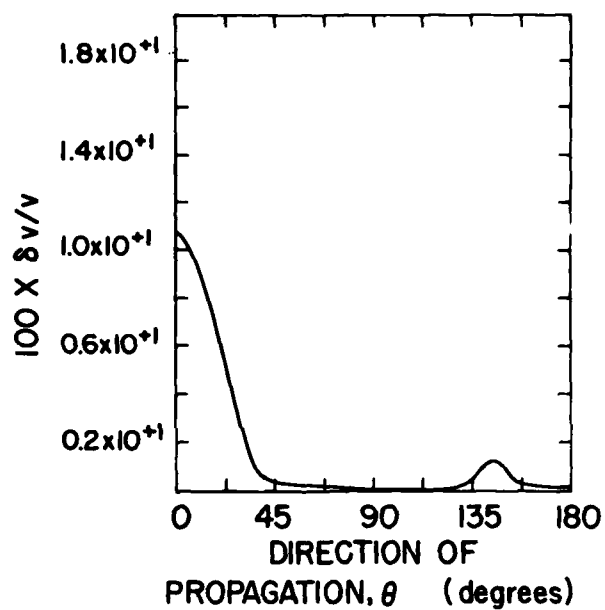


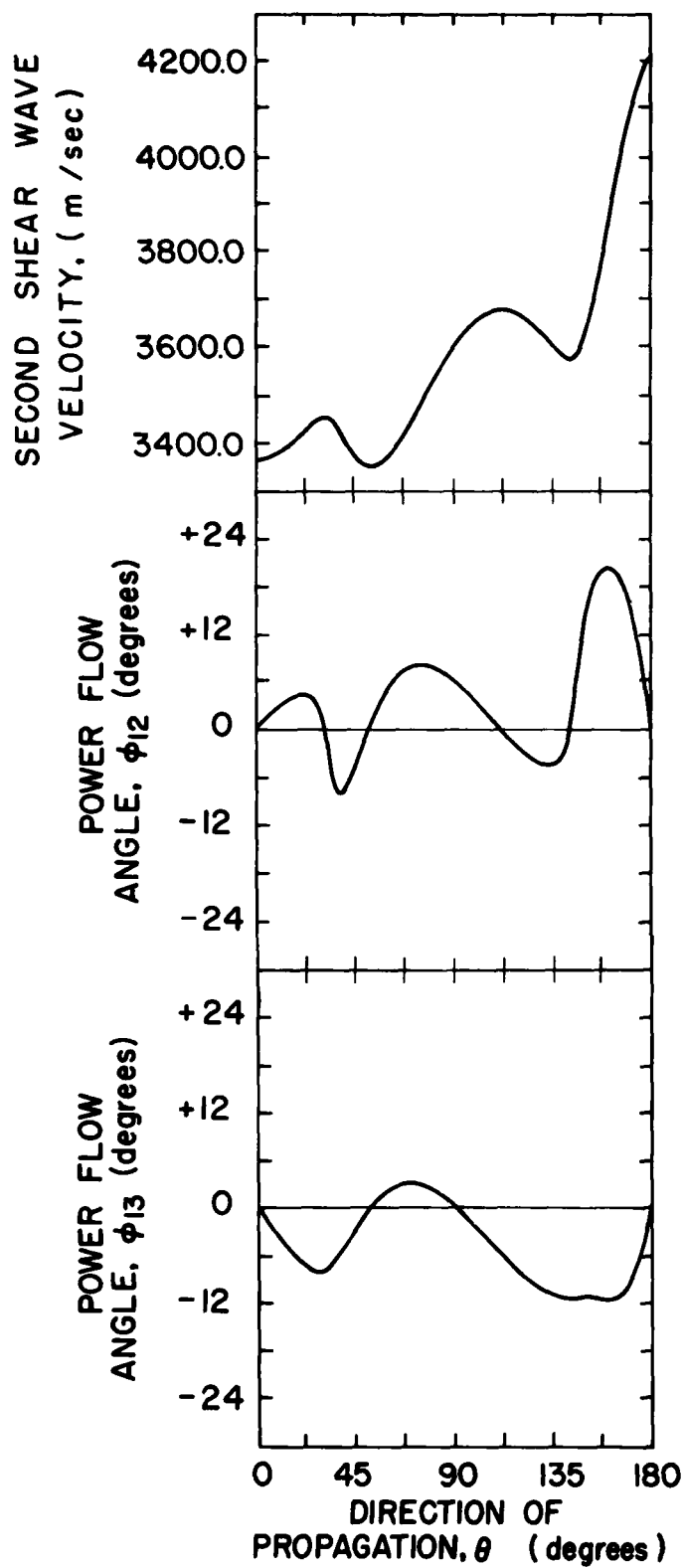
Y-PLANE
 LiTaO_3
(Smith and Welsh)



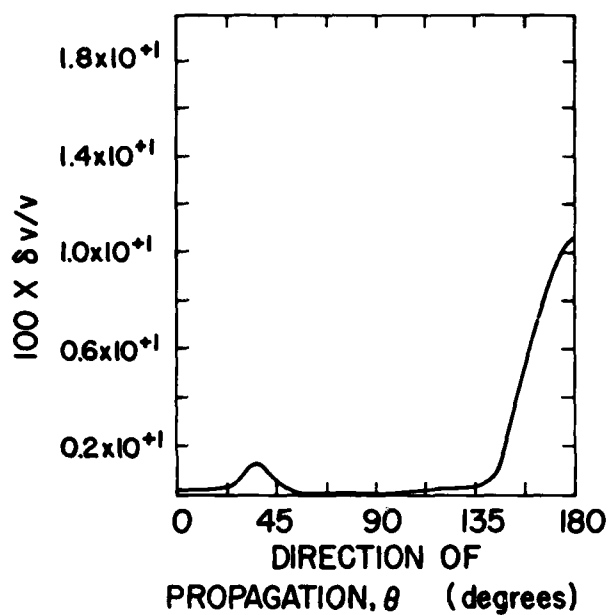


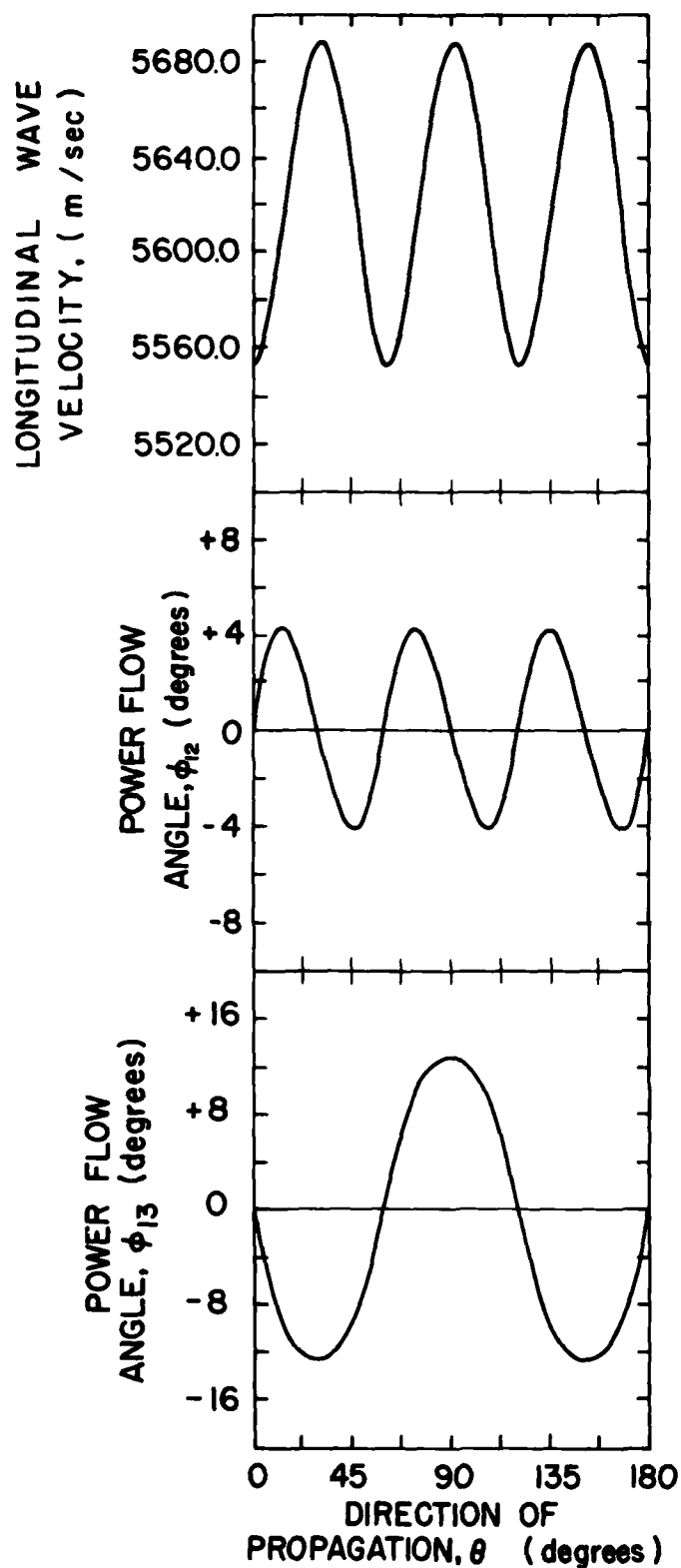
Y-PLANE
 LiTaO_3
(Smith and Welsh)



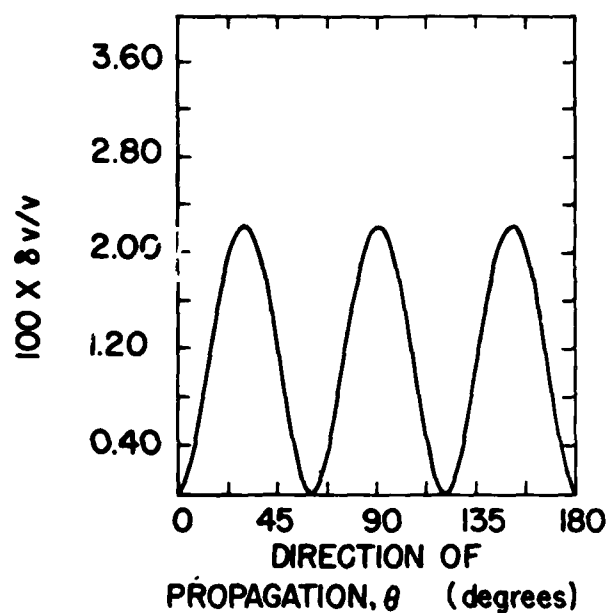


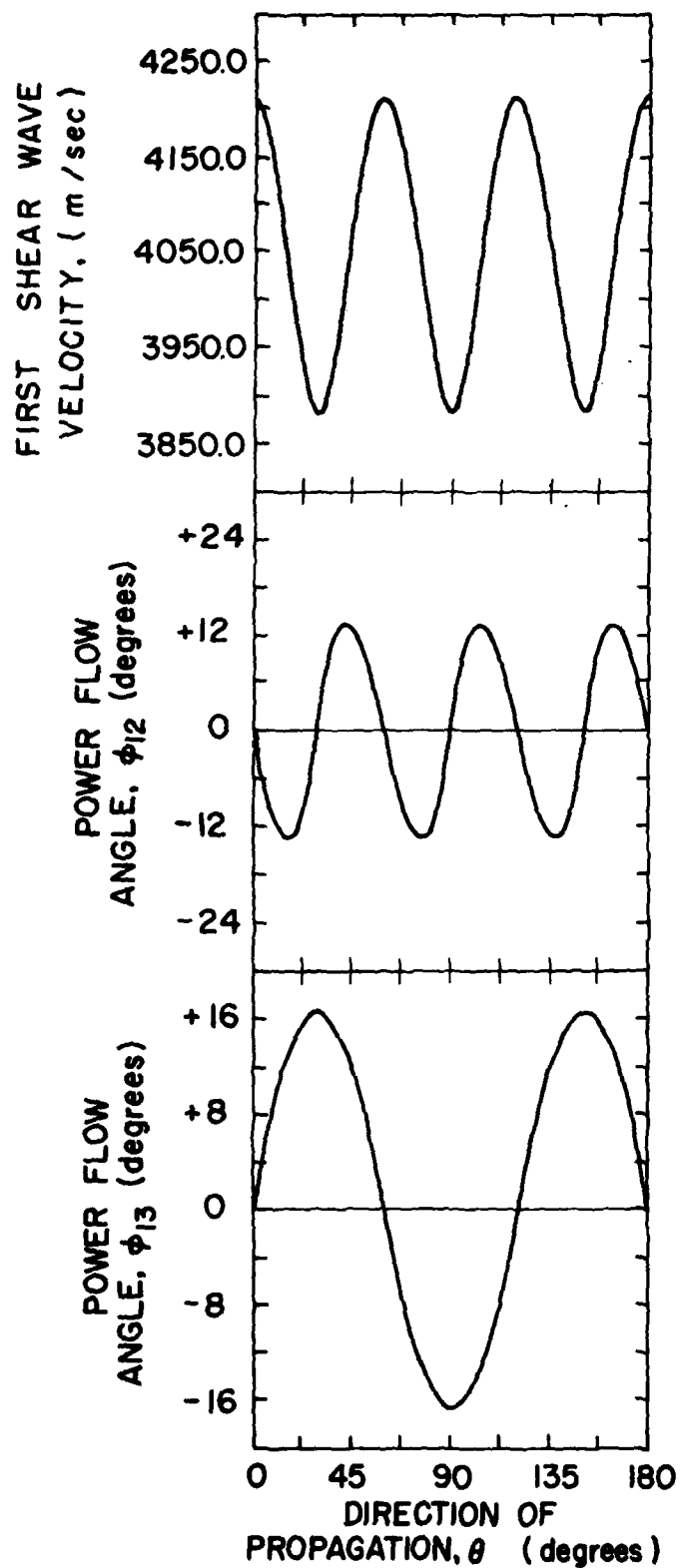
Y-PLANE
 LiTaO_3
(Smith and Welsh)



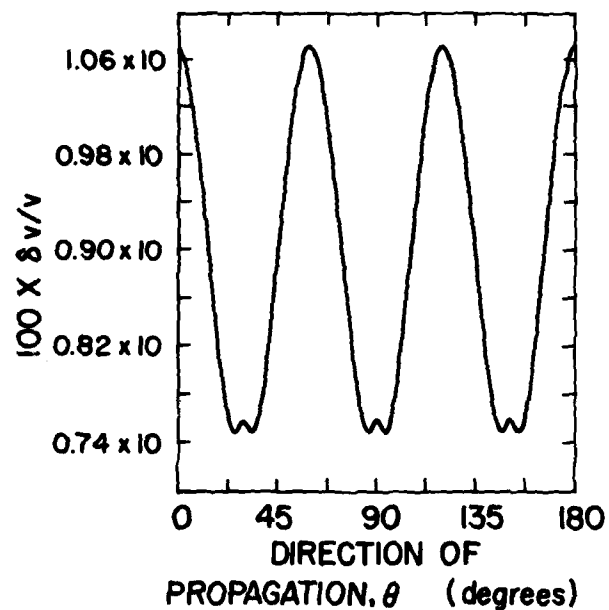


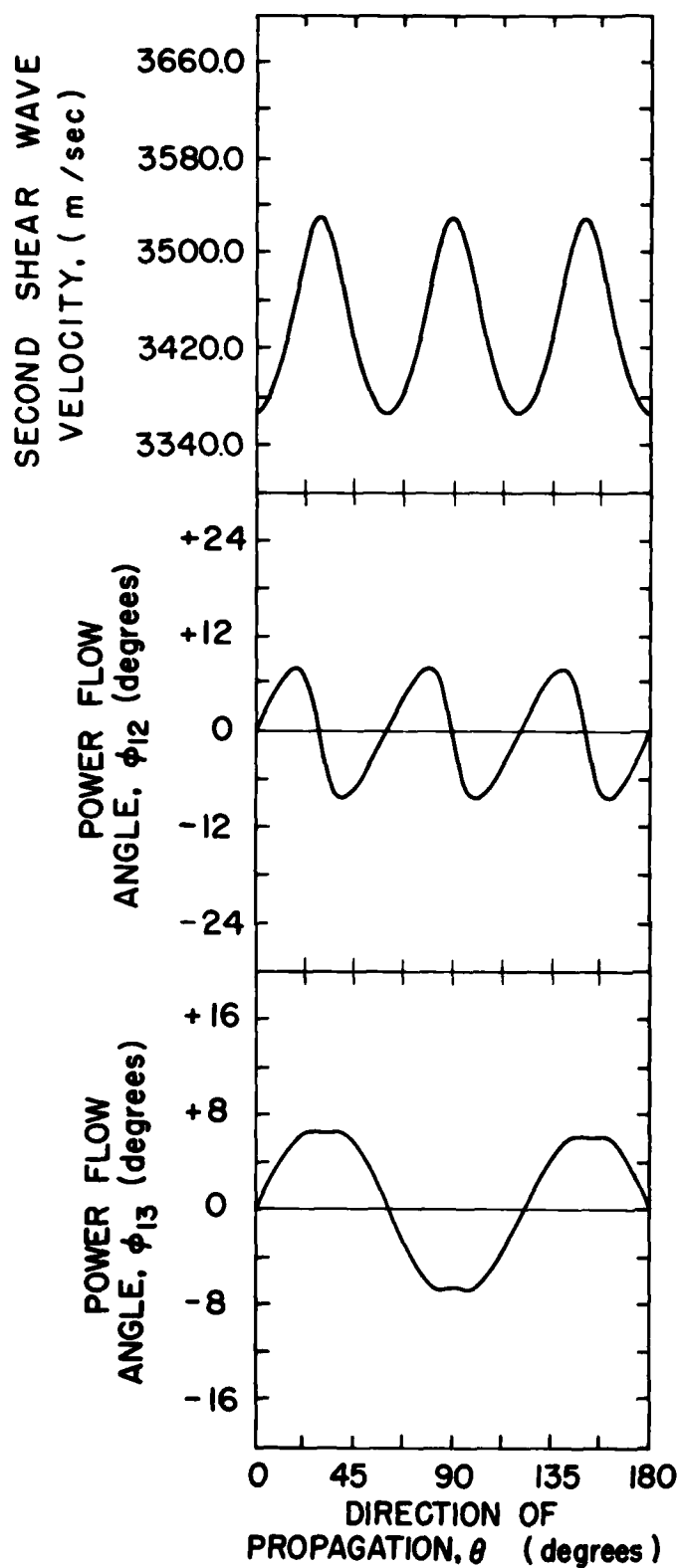
Z-PLANE
 LiTaO_3
(Smith and Welsh)



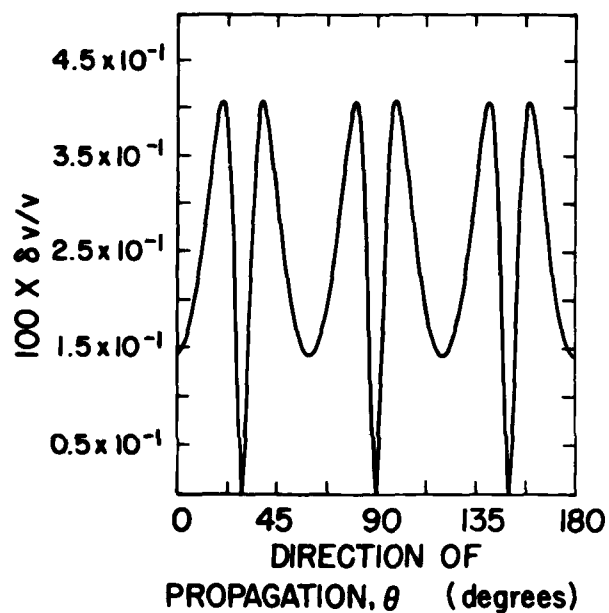


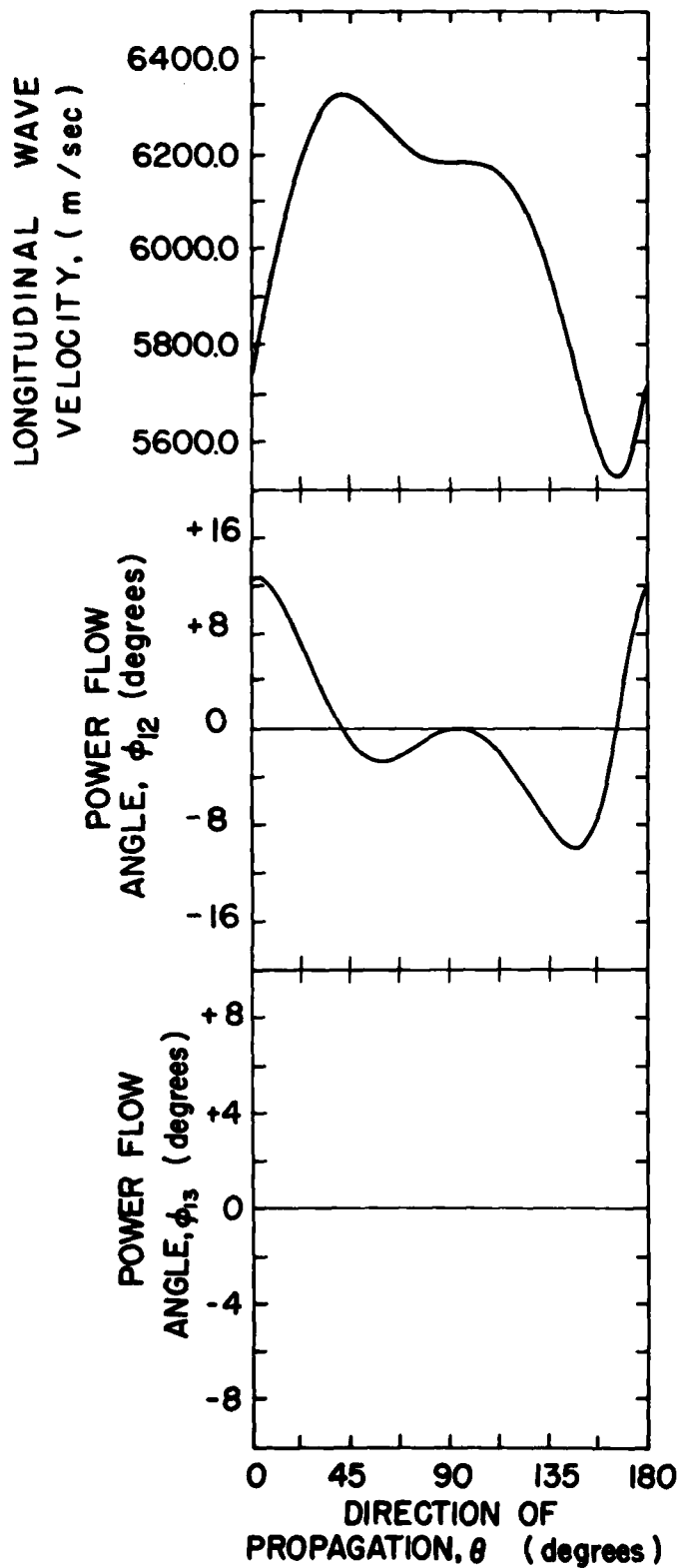
Z-PLANE
 LiTaO_3
(Smith and Welsh)



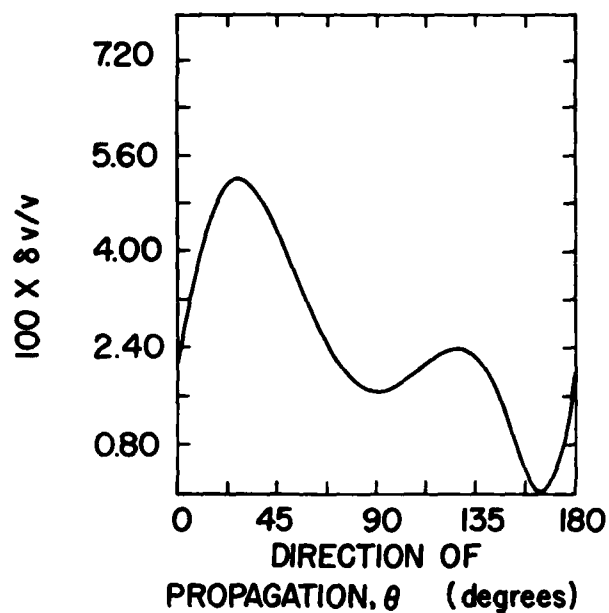


Z-PLANE
LiTaO₃
(Smith and Welsh)





X-PLANE
LiTaO₃
(Warner et al)



FIRST SHEAR WAVE
VELOCITY, (m/sec)

4020.0
3860.0
3700.0
3540.0
3380.0

POWER FLOW
ANGLE, ϕ_{12} (degrees)

+16
+8
0
-8
-16

POWER FLOW
ANGLE, ϕ_{13} (degrees)

+8
+4
0
-4
-8

0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

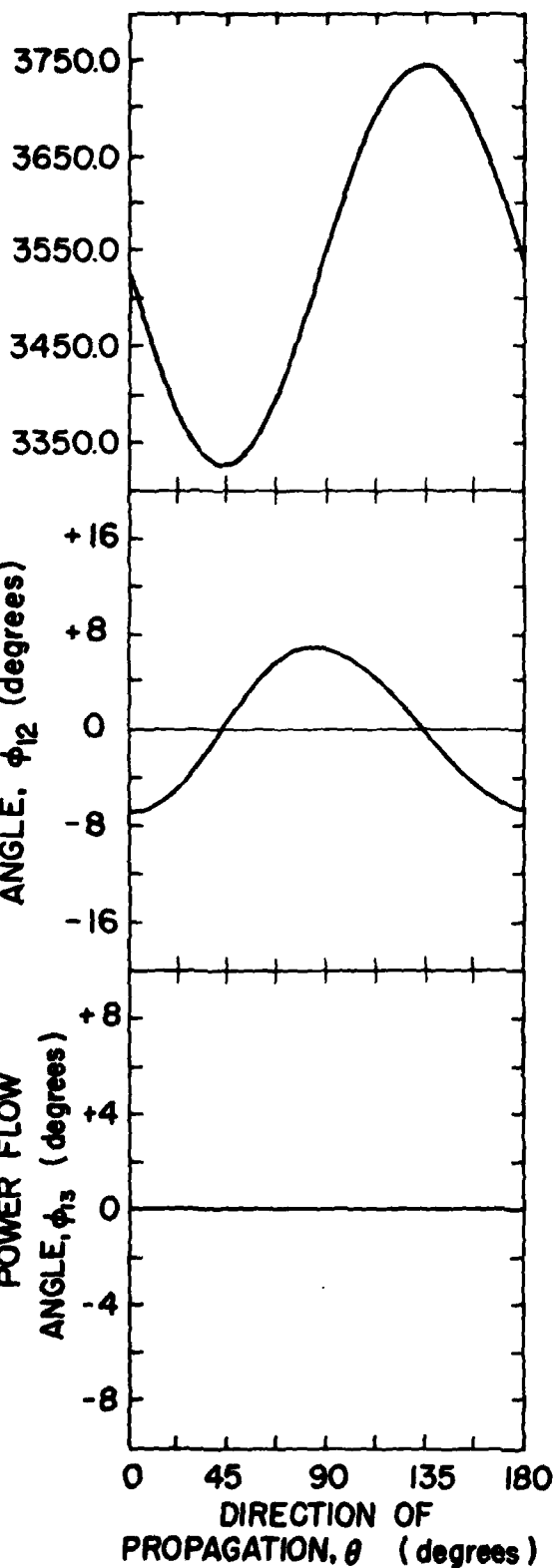
X-PLANE
 LiTaO_3
(Warner et al)

100 X $\delta v/v$

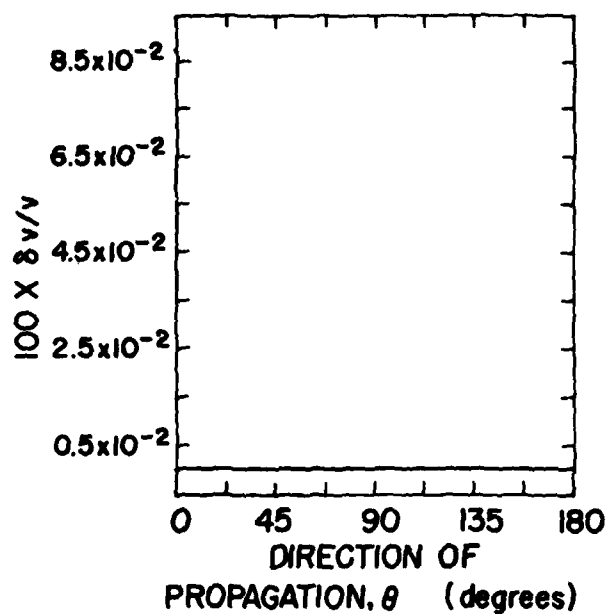
9.00
7.00
5.00
3.00
1.00

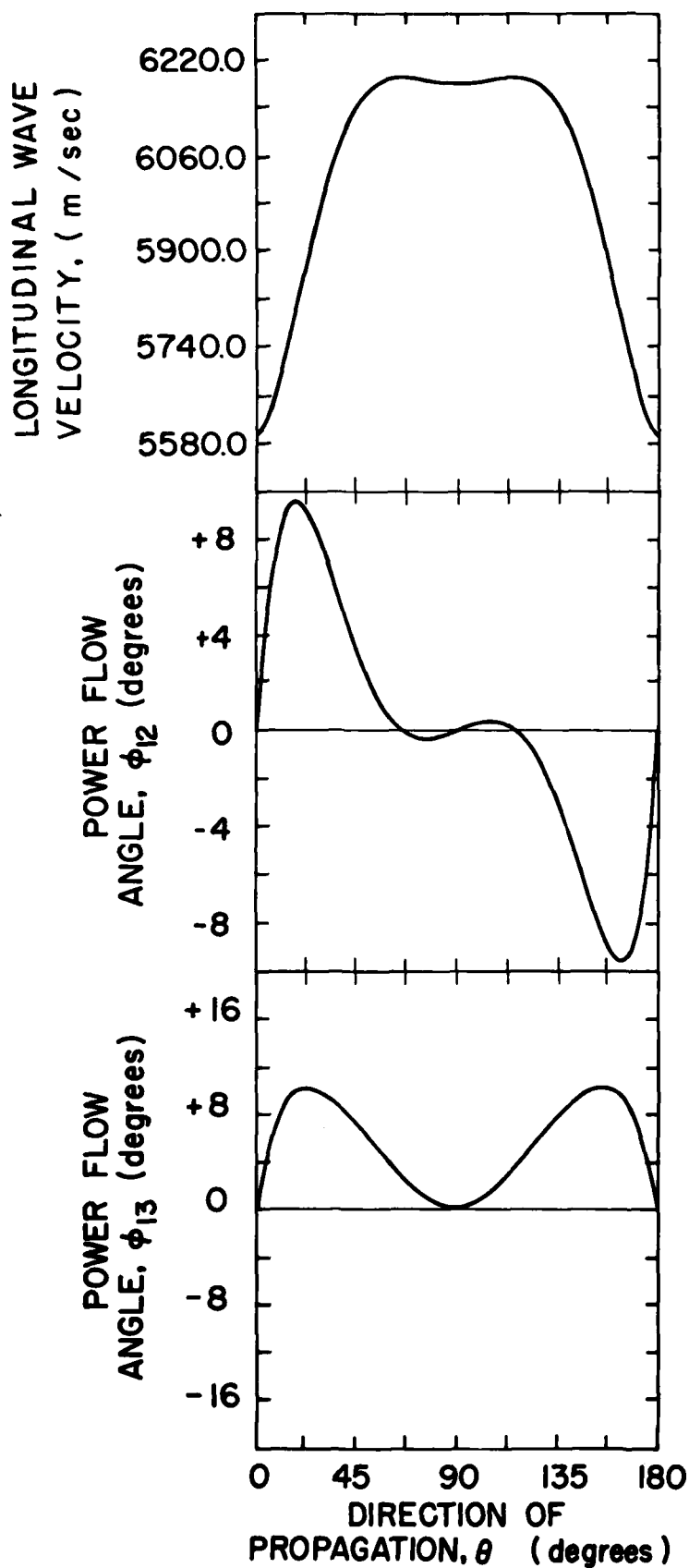
0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

SECOND SHEAR WAVE
VELOCITY, (m/sec)

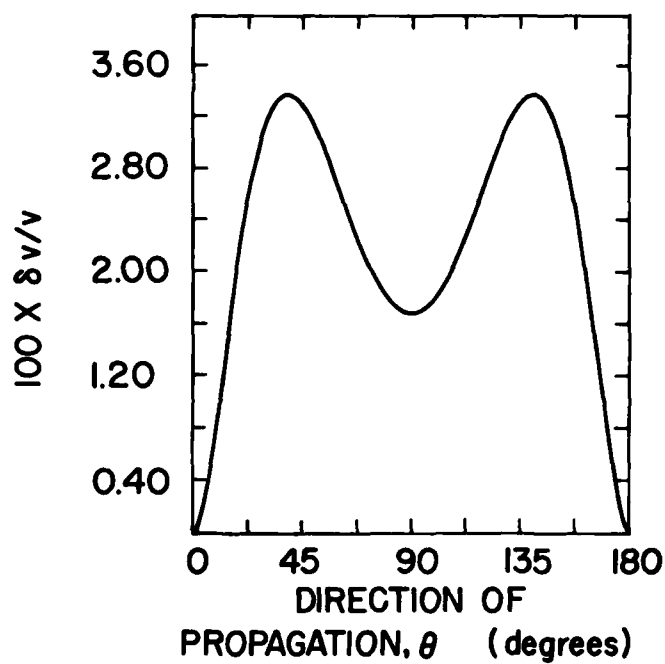


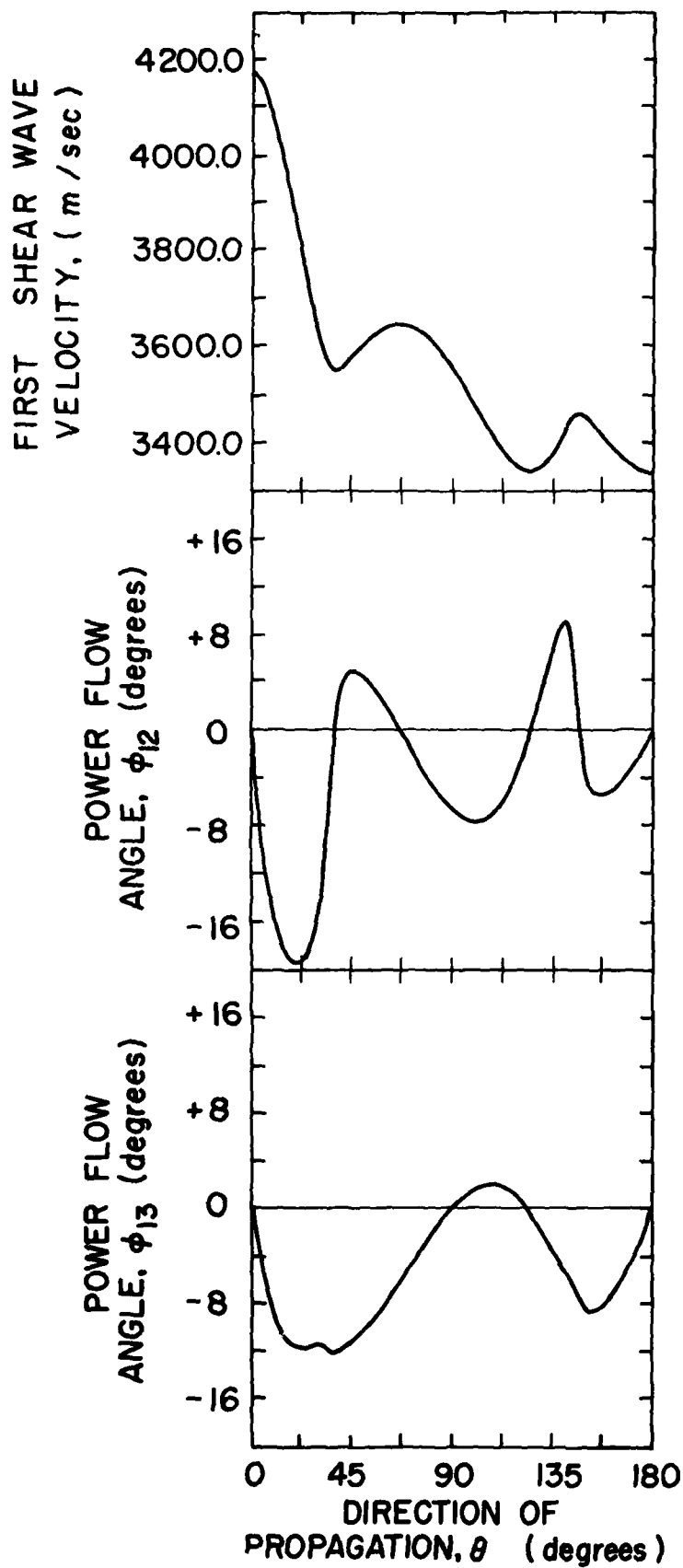
X-PLANE
 LiTaO_3
(Warner et al)



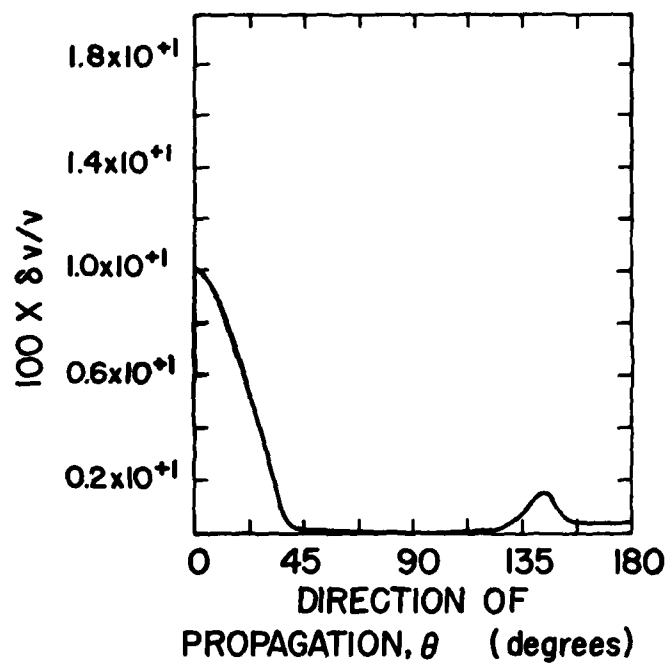


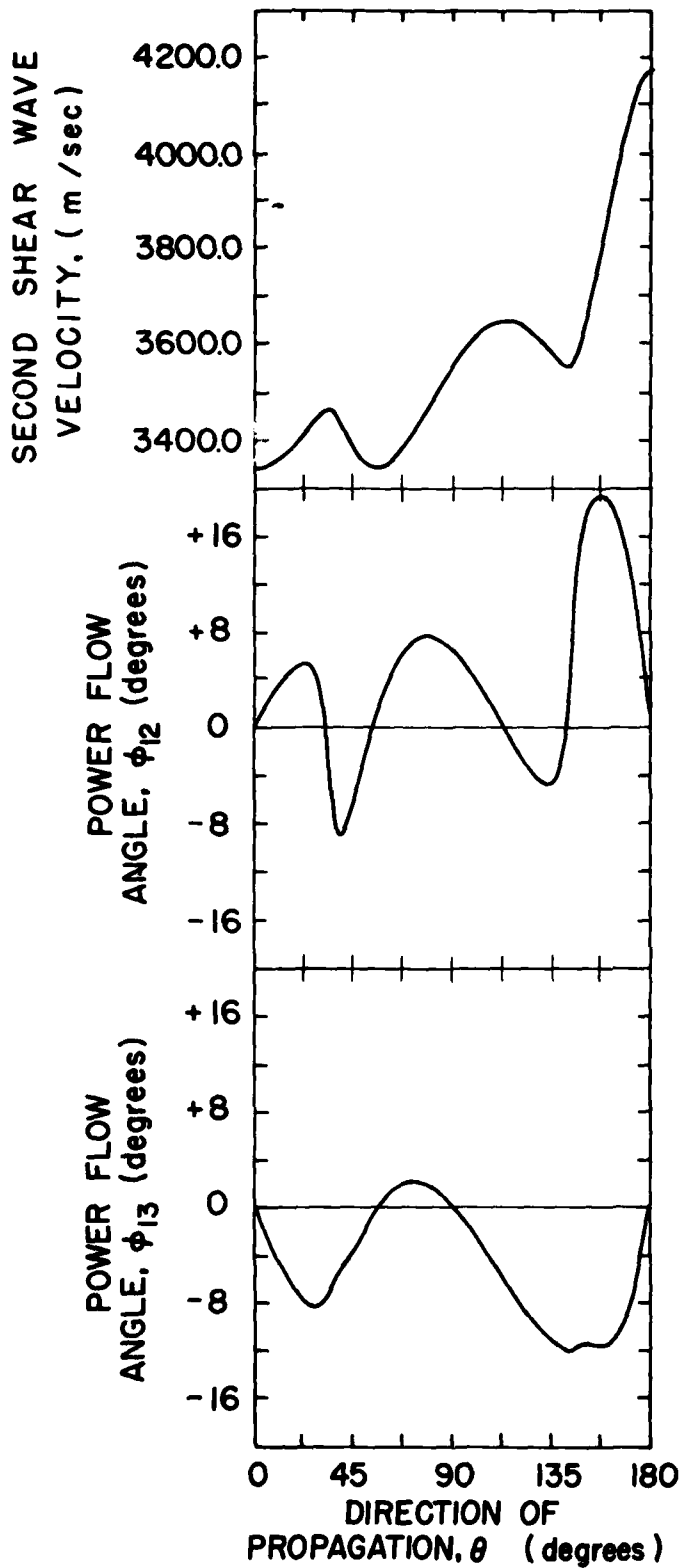
Y-PLANE
 LiTaO_3
(Warner et al)



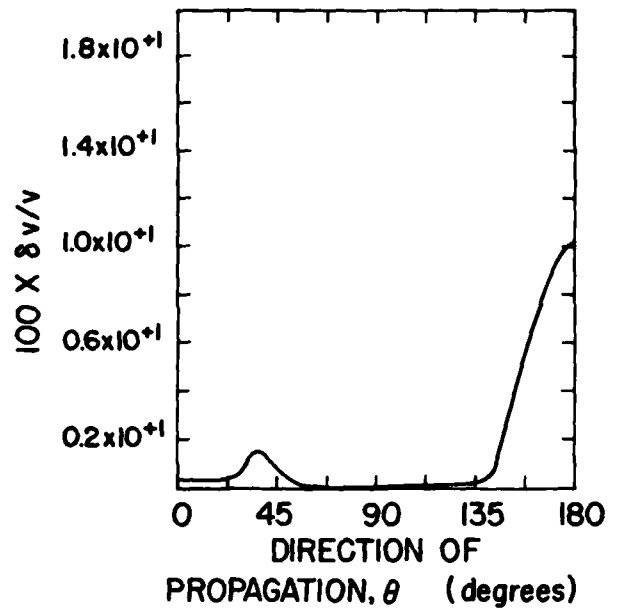


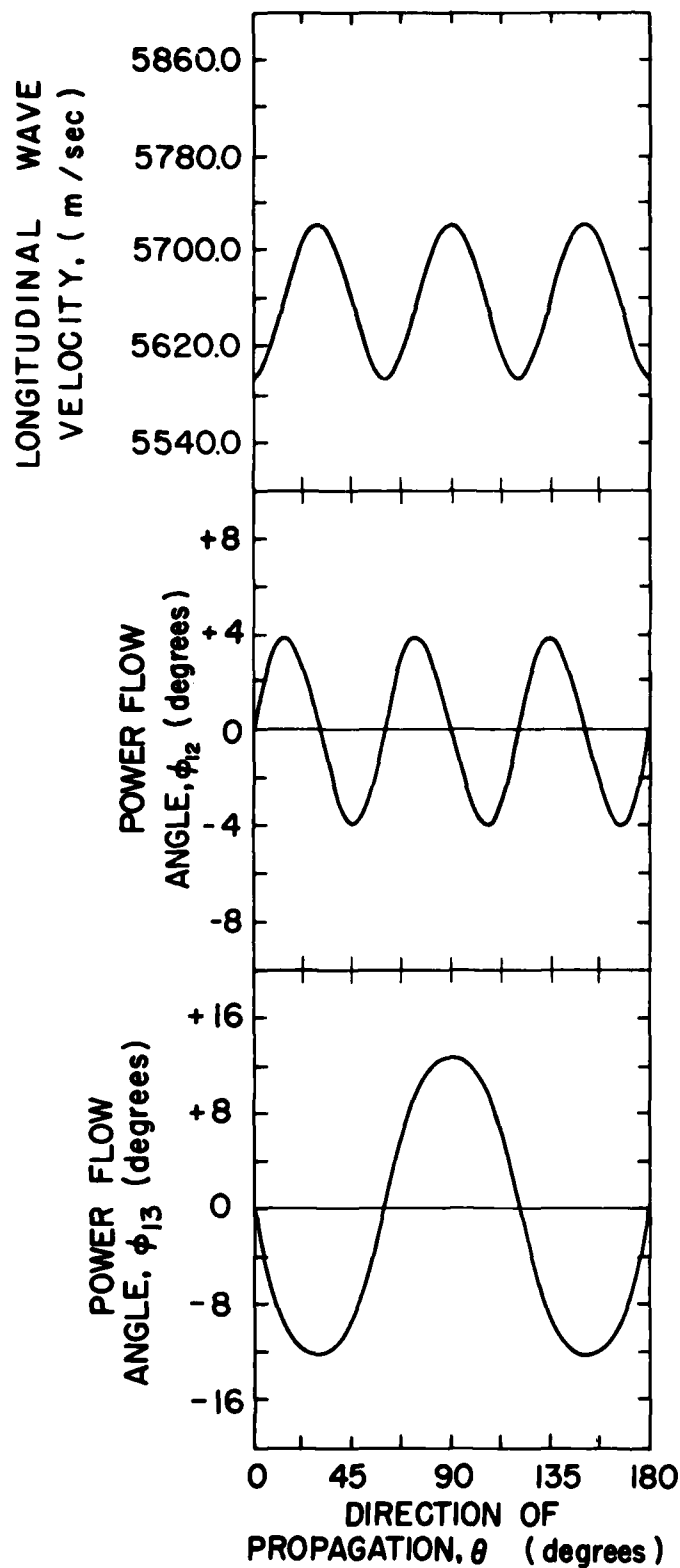
Y-PLANE
 LiTaO_3
(Warner et al)



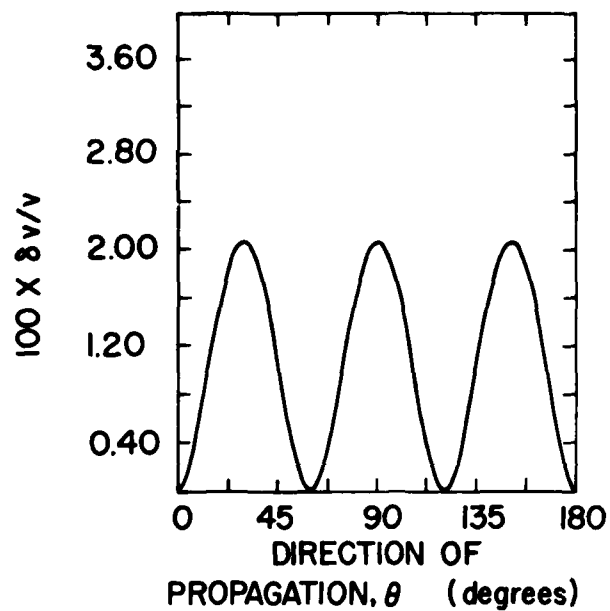


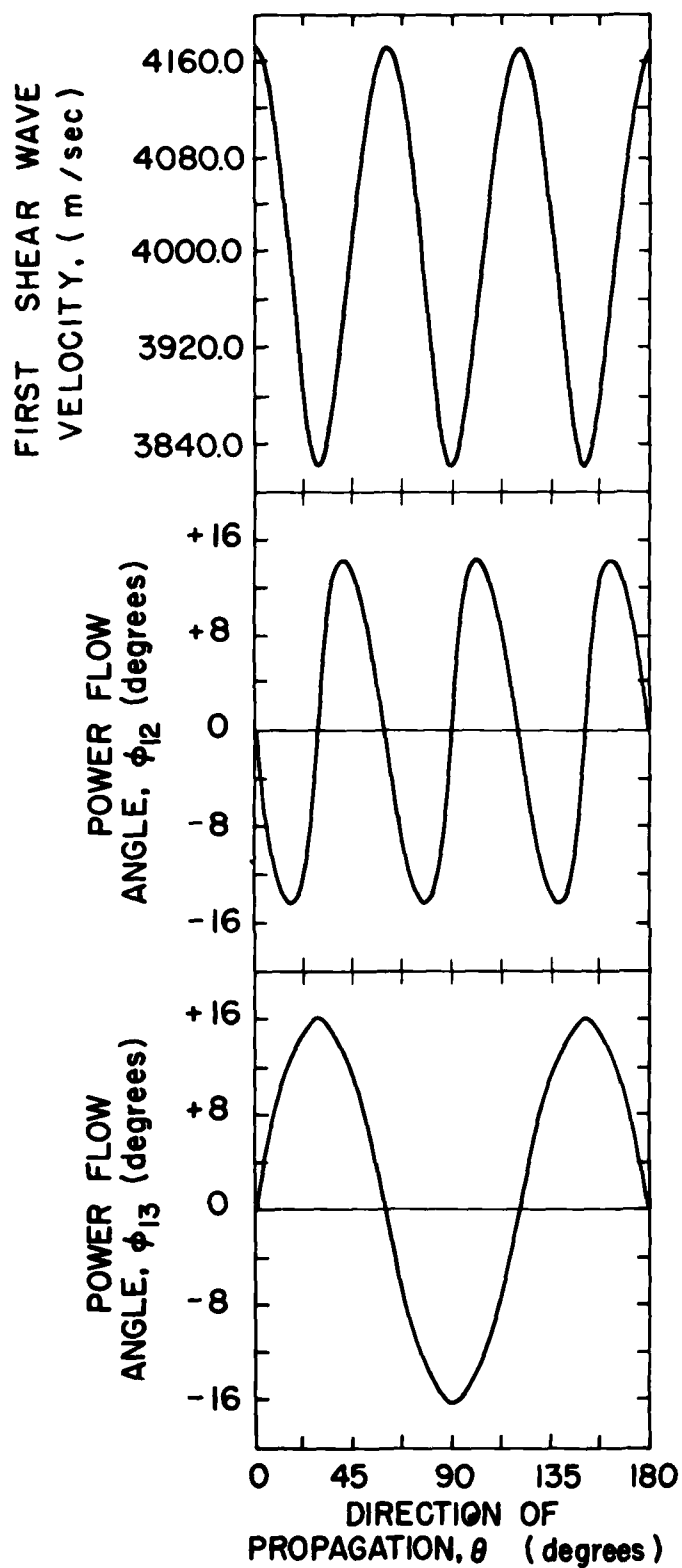
Y-PLANE
 LiTaO_3
(Warner et al)



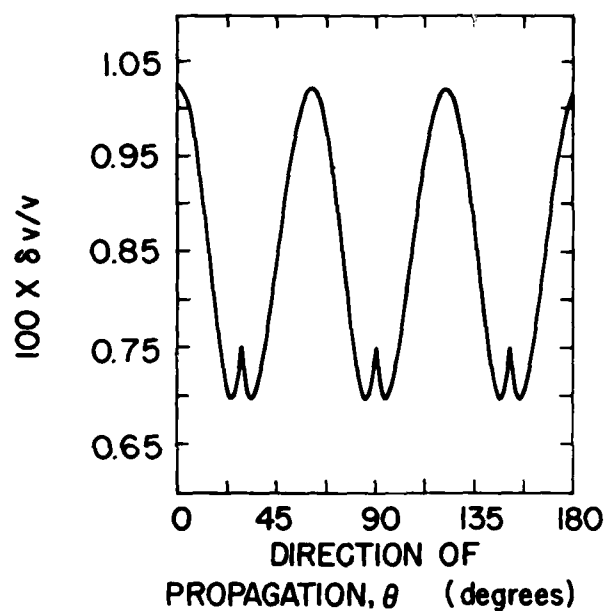


Z-PLANE
 LiTaO_3
(Warner et al)

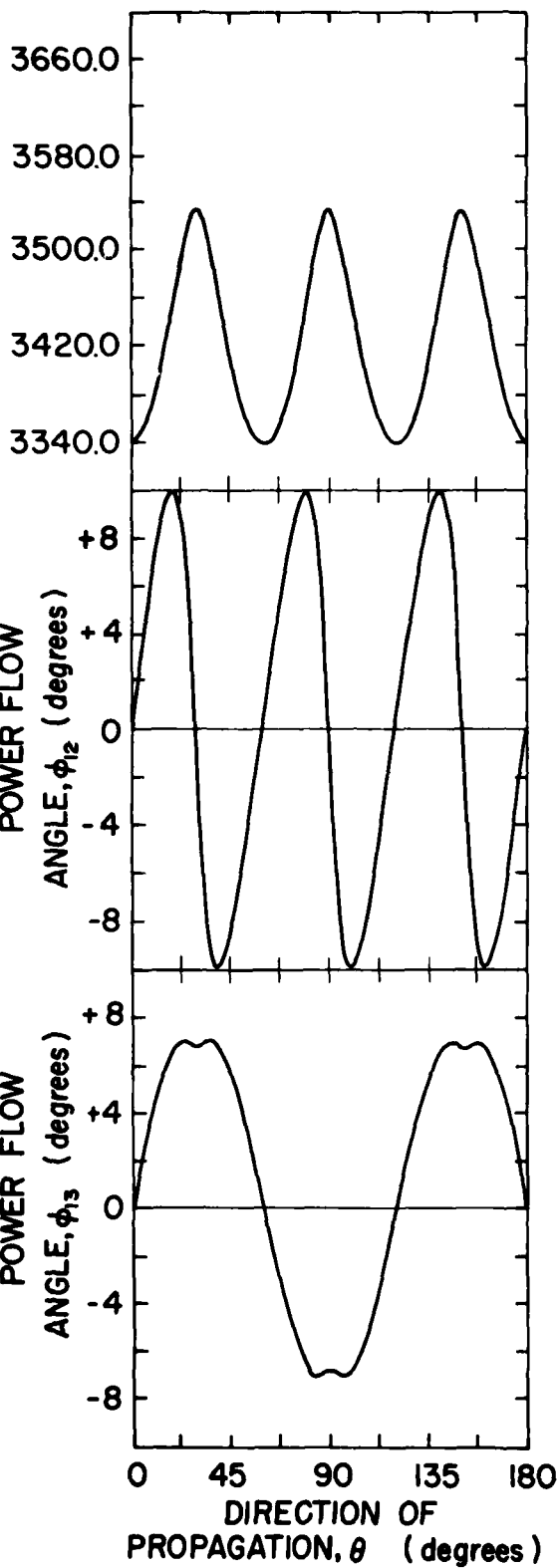




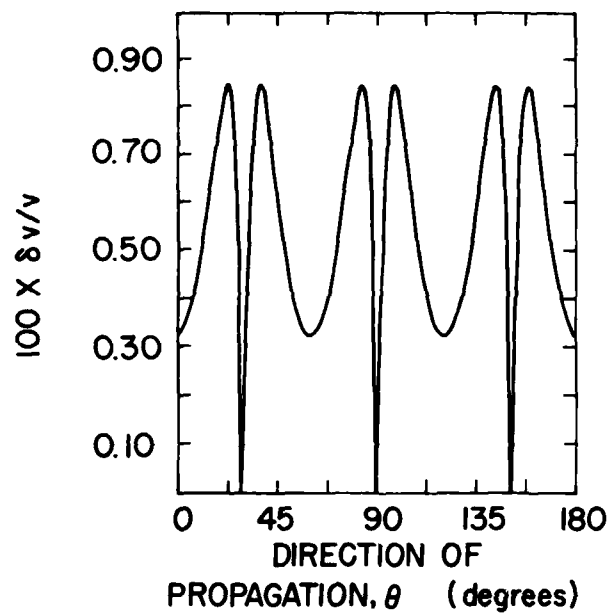
Z-PLANE
 LiTaO_3
(Warner et al)

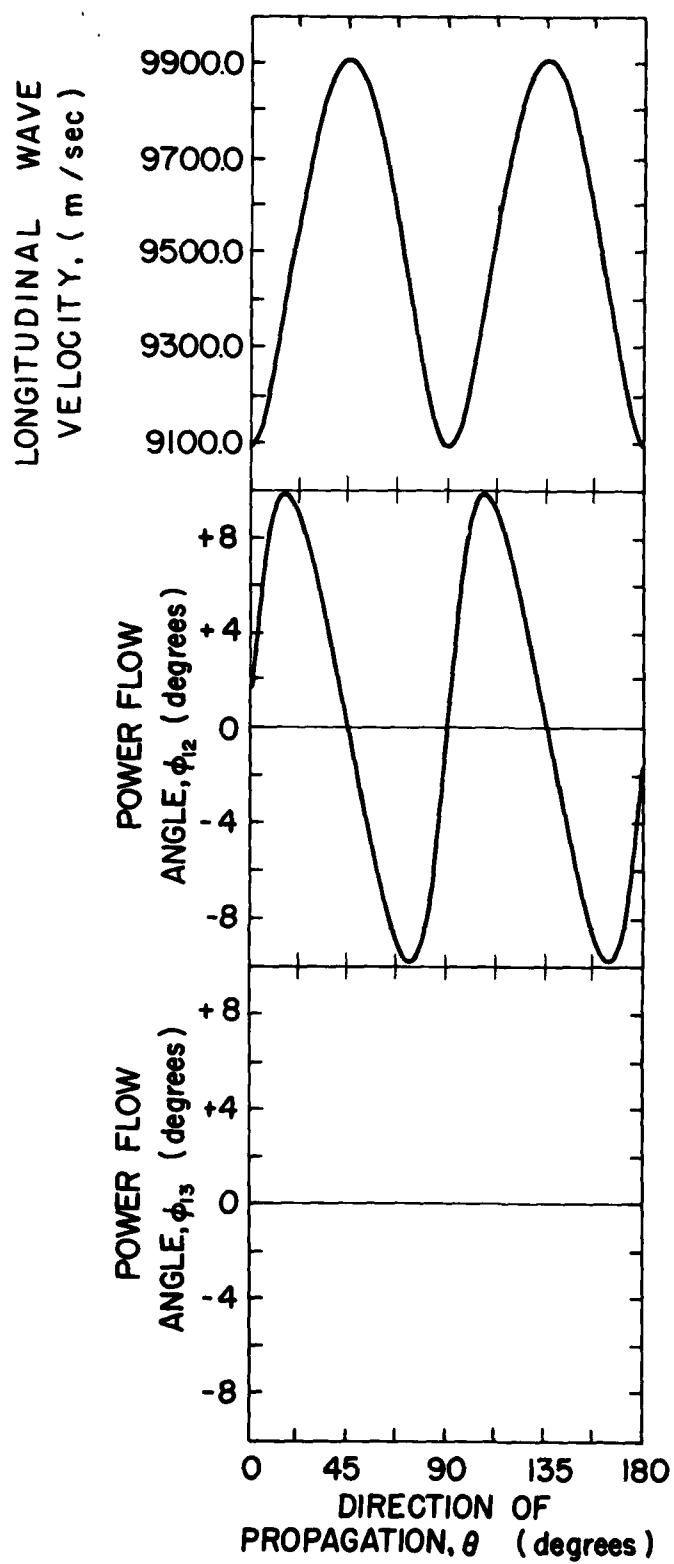


SECOND SHEAR WAVE
VELOCITY, (m/sec)

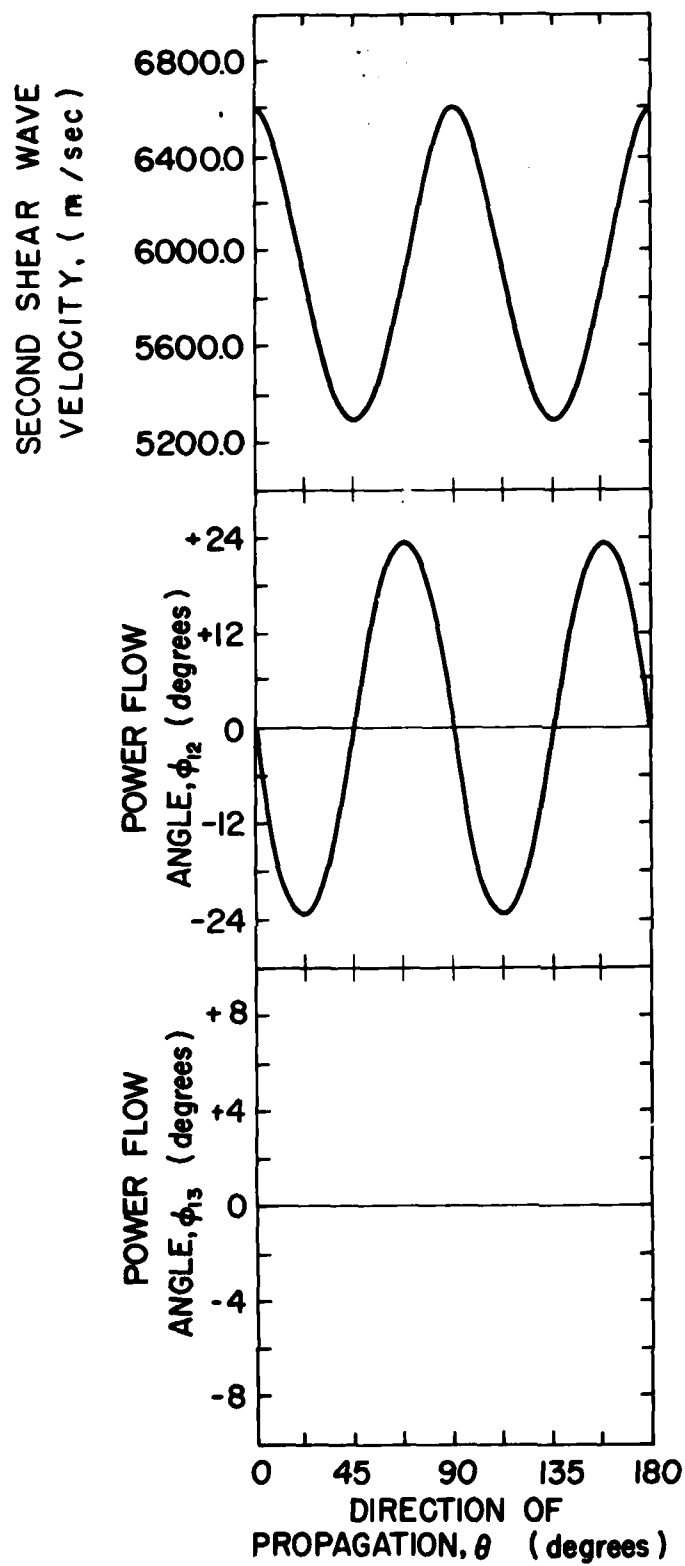


Z-PLANE
 LiTaO_3
(Warner et al)



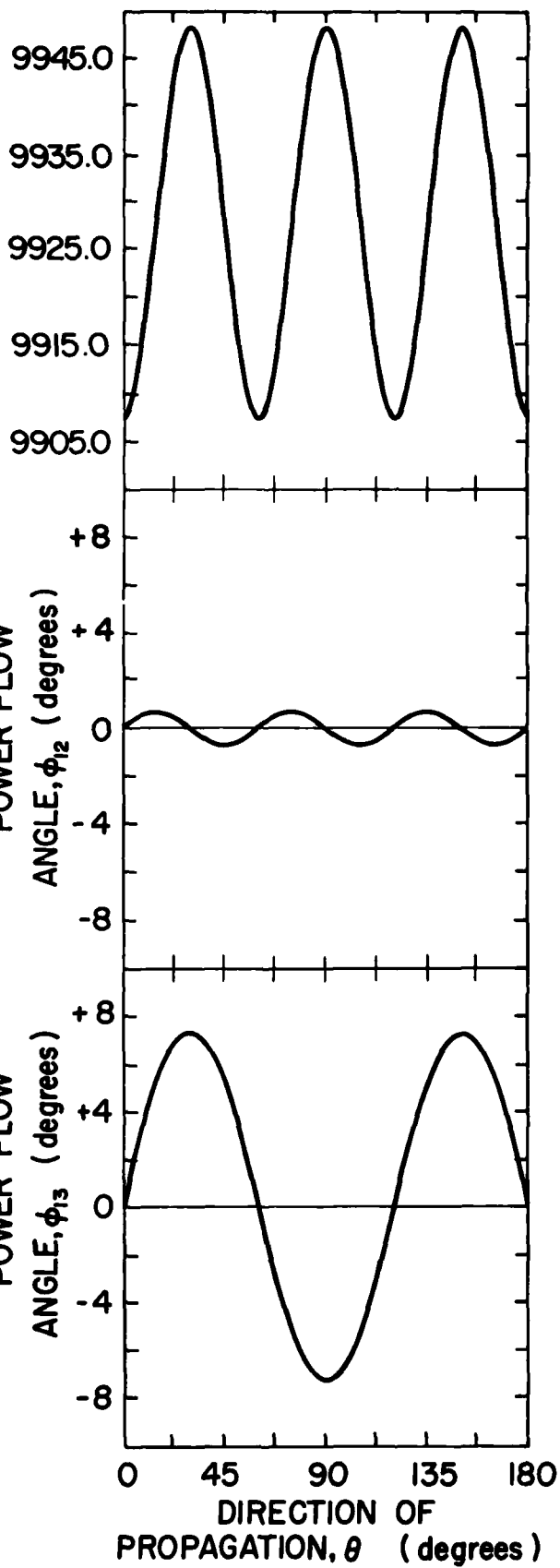


Z-PLANE
MgO

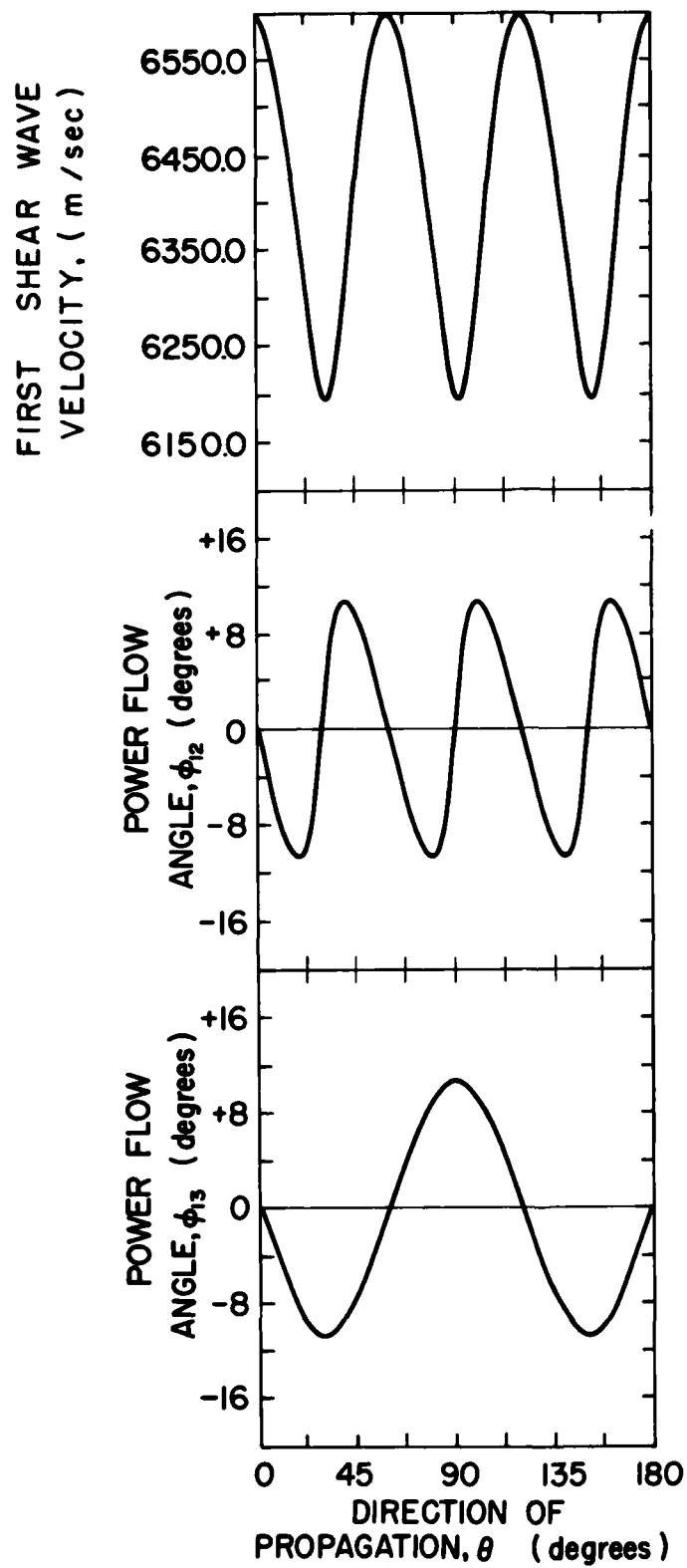


Z-PLANE
MgO

LONGITUDINAL WAVE
VELOCITY, (m / sec)



III - PLANE
MgO



III-PLANE
MgO

SECOND SHEAR WAVE
VELOCITY, (m / sec)

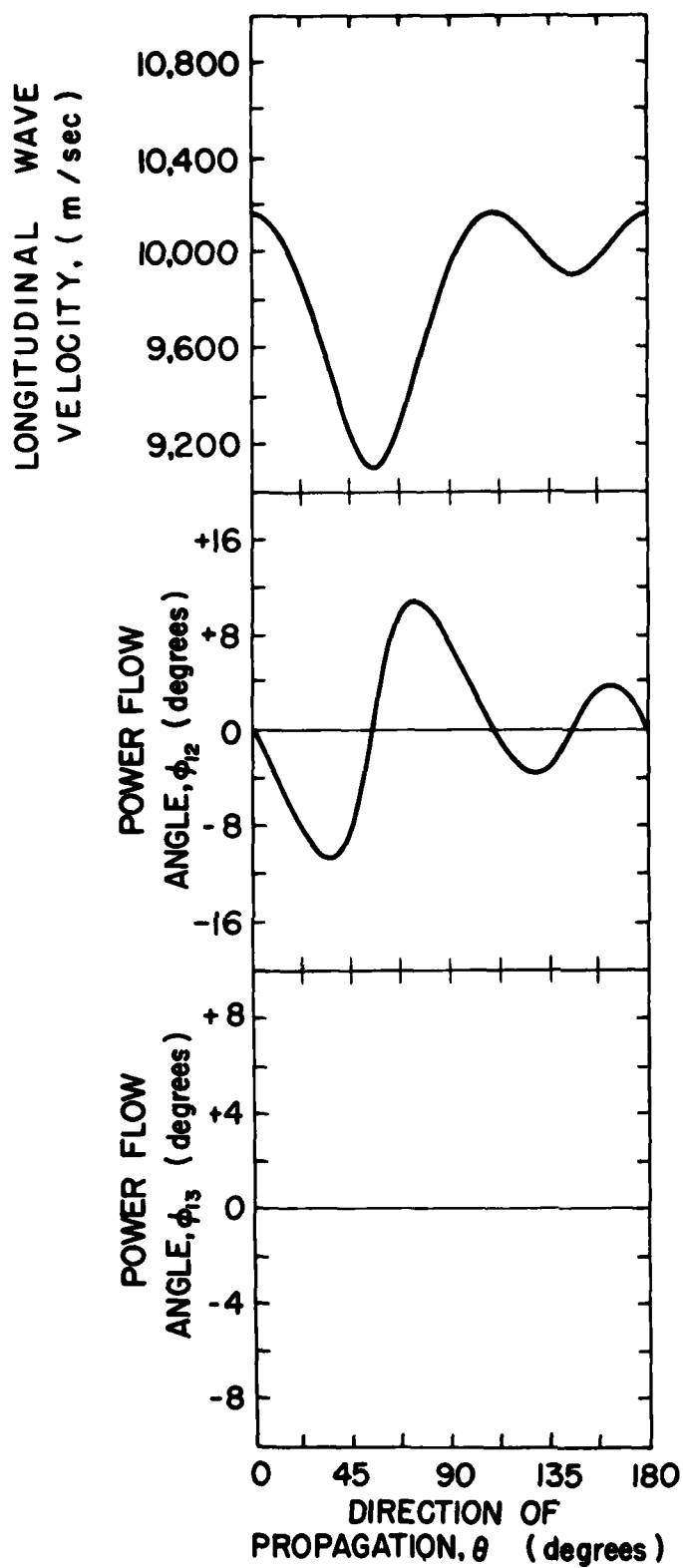
5660.0
5580.0
5500.0
5420.0
5340.0

III-PLANE
MgO

POWER FLOW
ANGLE, ϕ_2 (degrees)
+16
+8
0
-8
-16

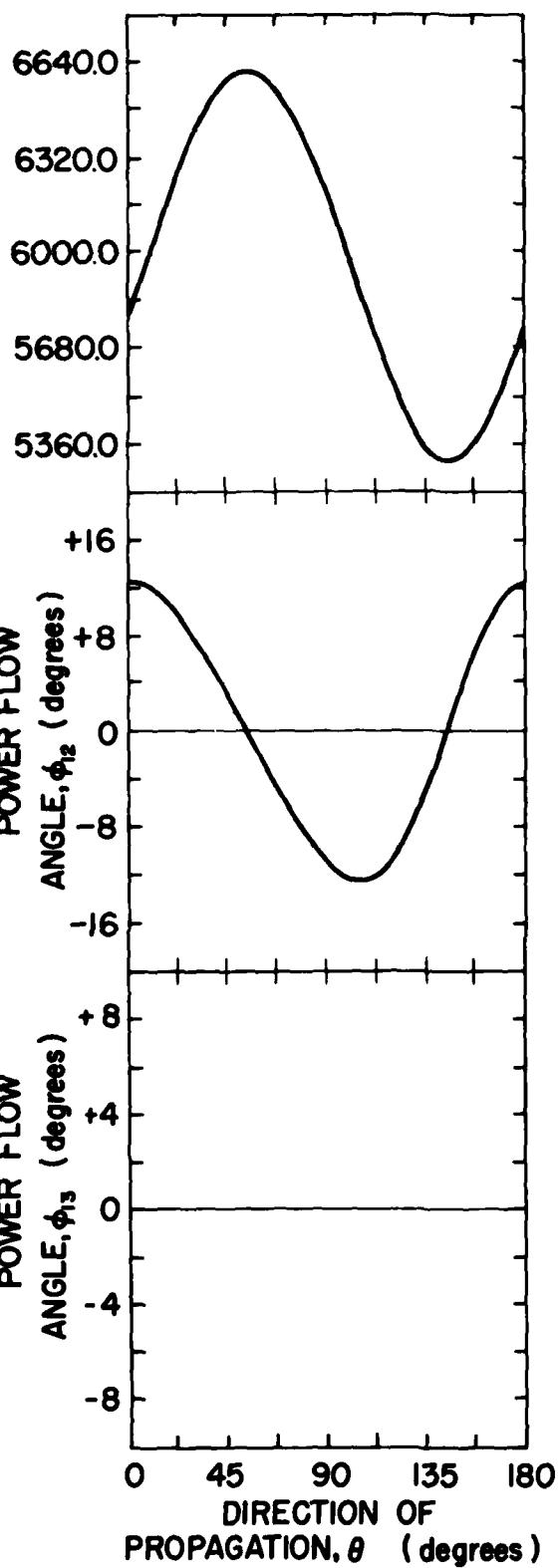
POWER FLOW
ANGLE, ϕ_3 (degrees)
+8
+4
0
-4
-8

0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)



110-PLANE
MgO

FIRST SHEAR WAVE
VELOCITY, (m/sec)



110-PLANE
MgO

SECOND SHEAR WAVE
VELOCITY, (m / sec)

6640.0
6320.0
6000.0
5680.0
5360.0

POWER FLOW

ANGLE, ϕ_{12} (degrees)

+16
+8
0
-8
-16

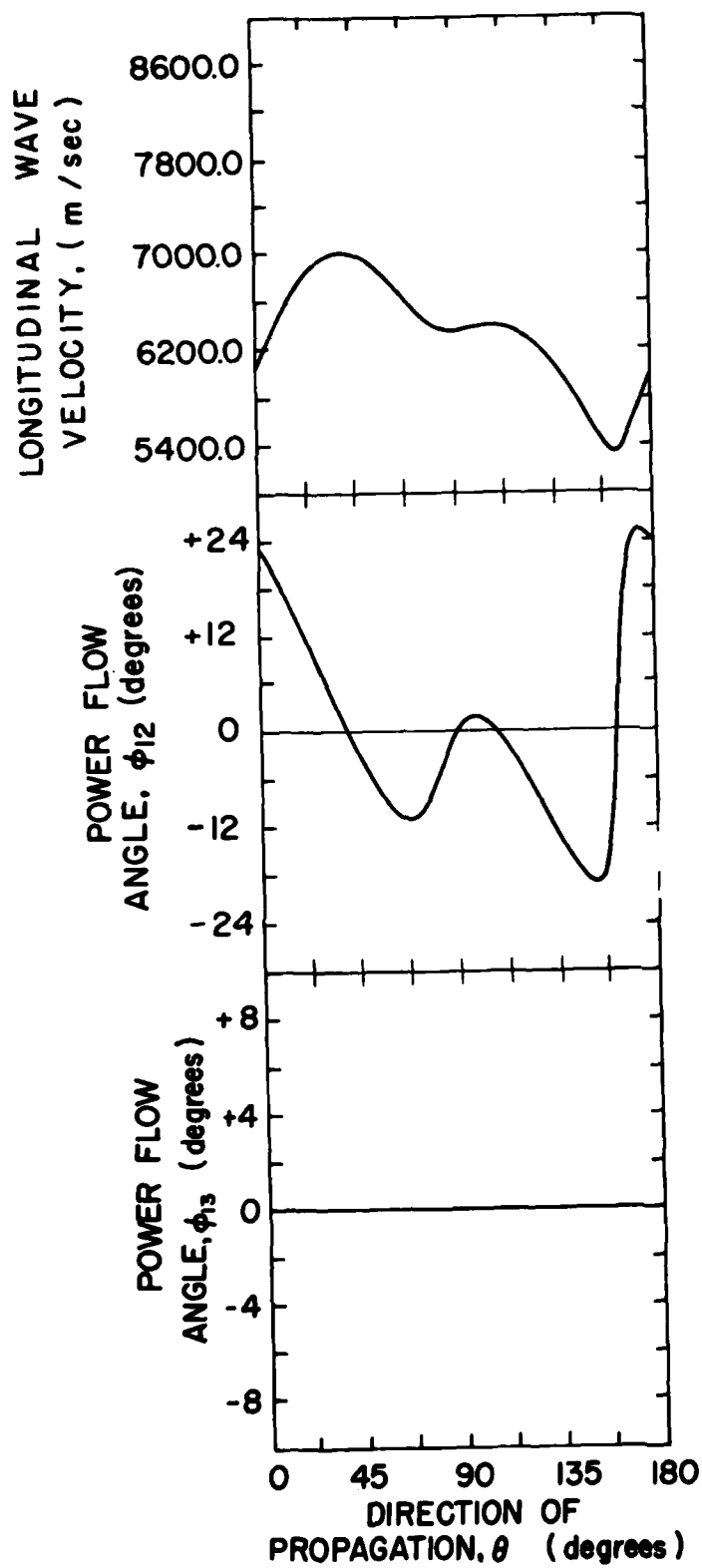
POWER FLOW

ANGLE, ϕ_{13} (degrees)

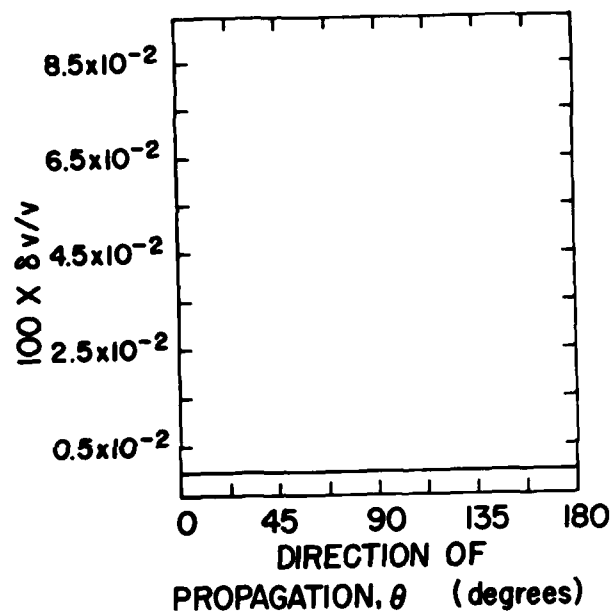
+8
+4
0
-4
-8

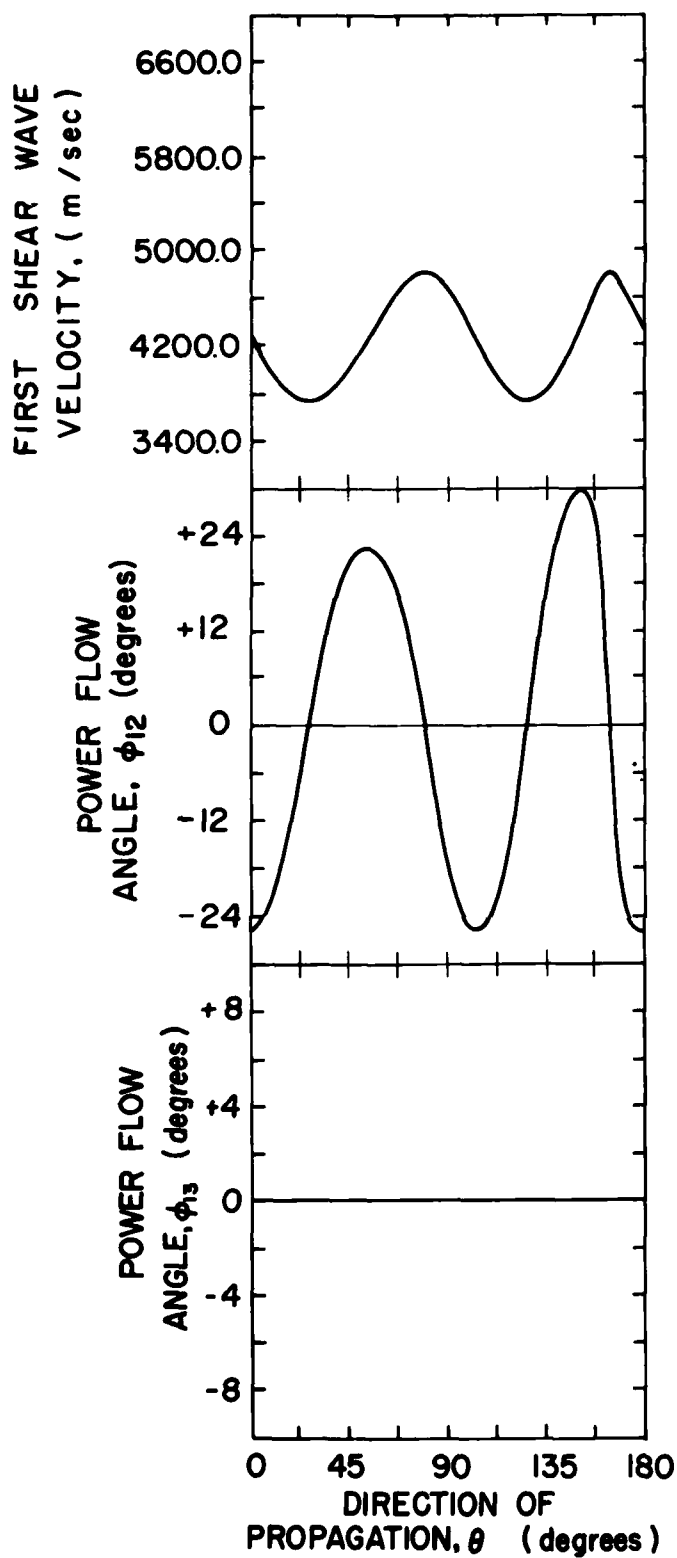
0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

110-PLANE
MgO

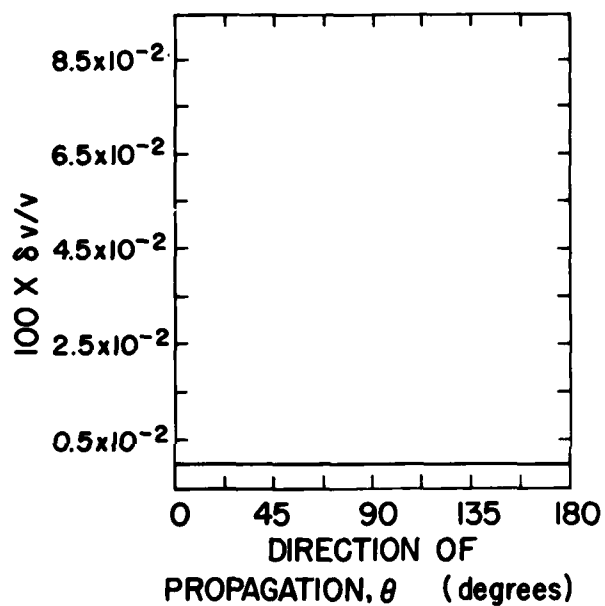


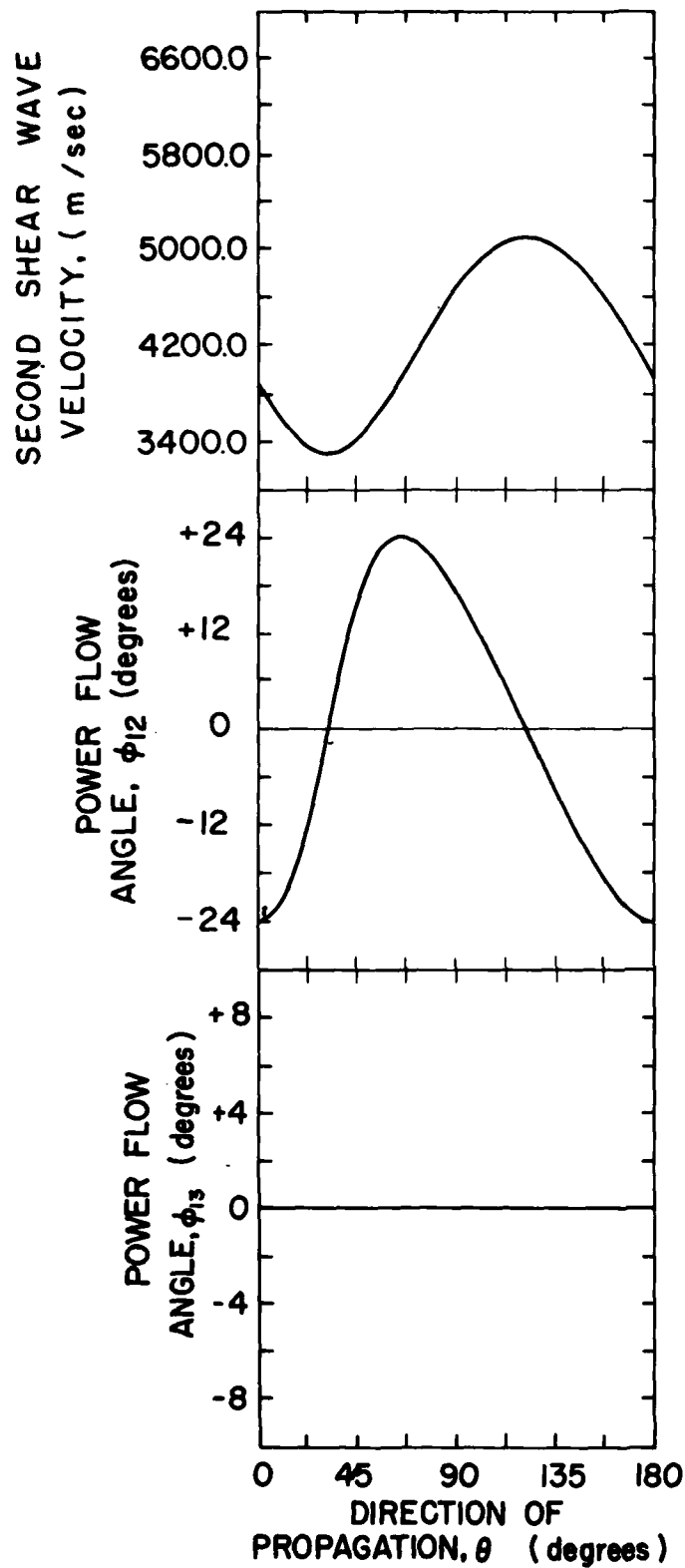
X-PLANE QUARTZ



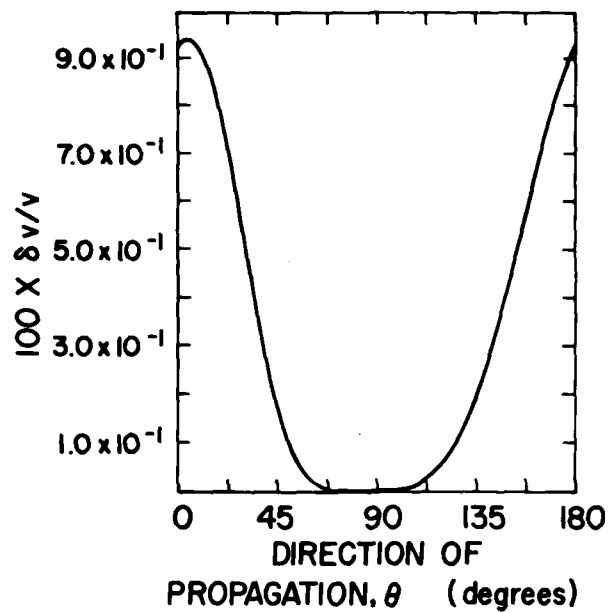


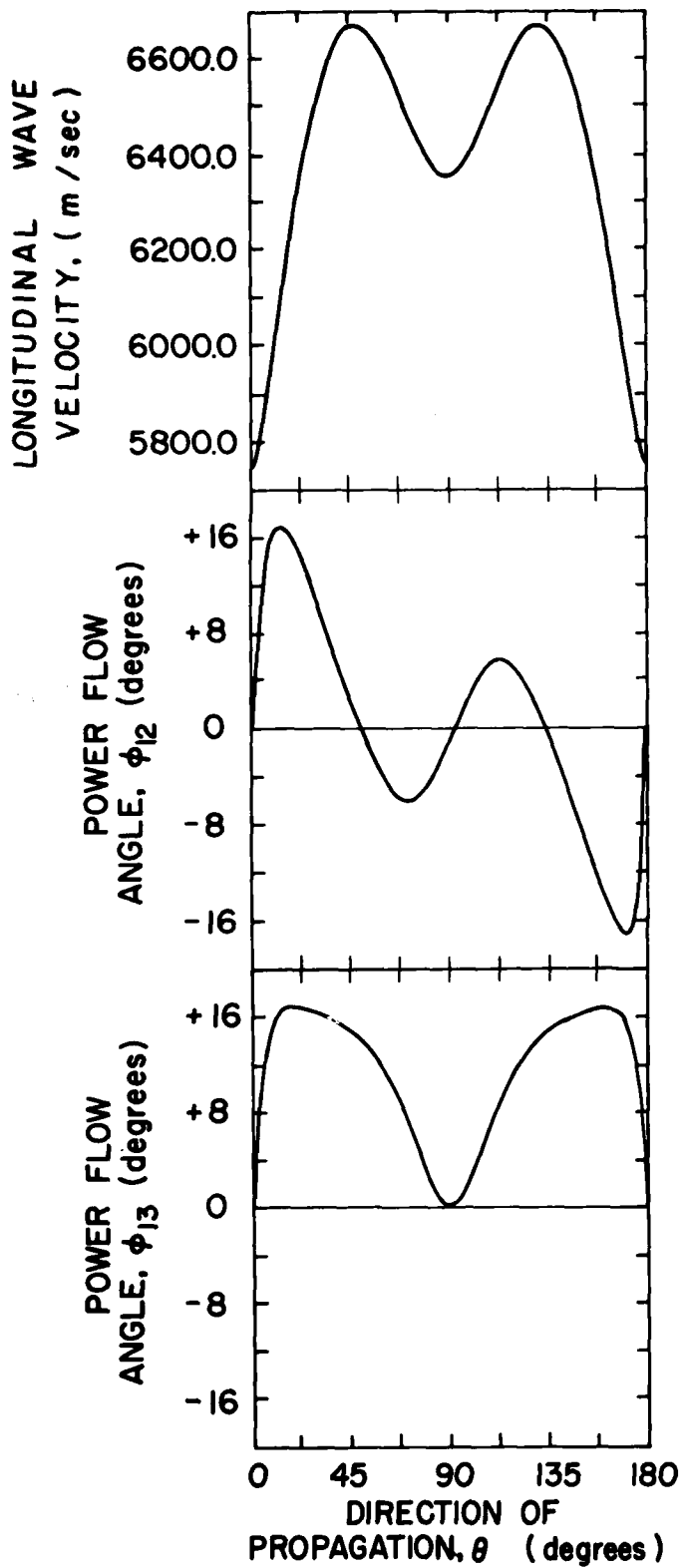
X-PLANE
QUARTZ



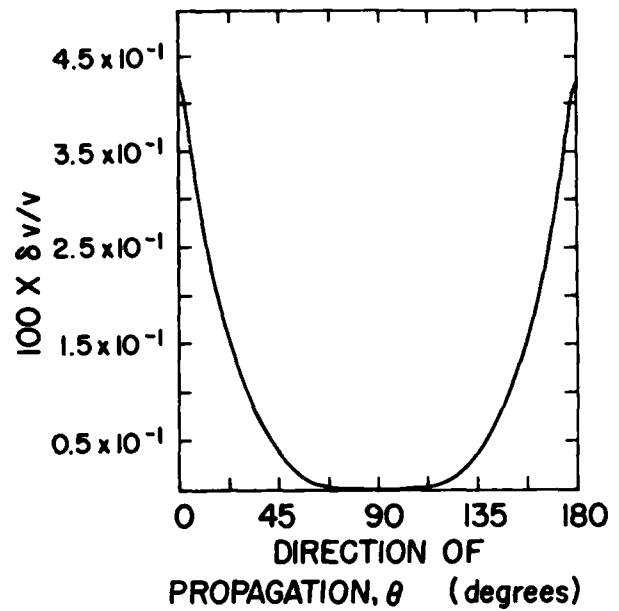


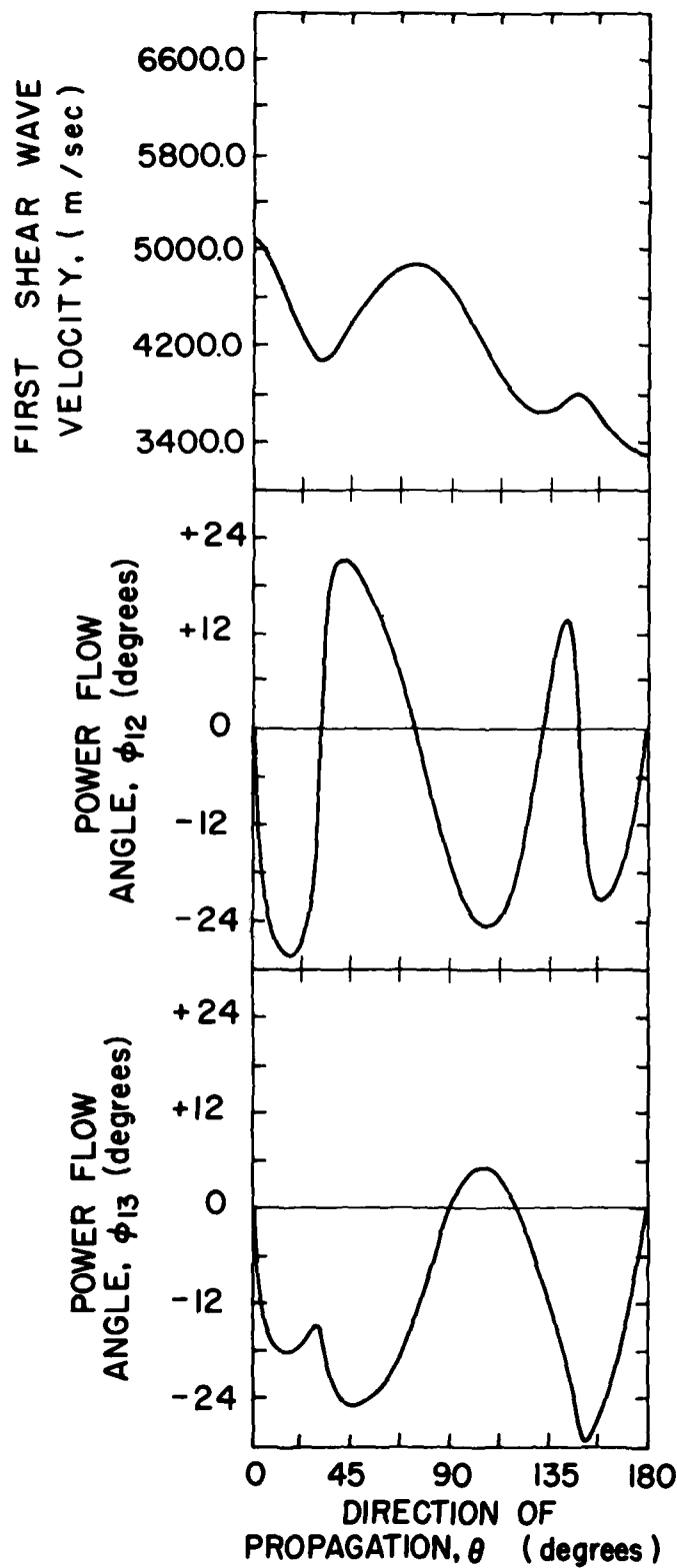
X-PLANE QUARTZ



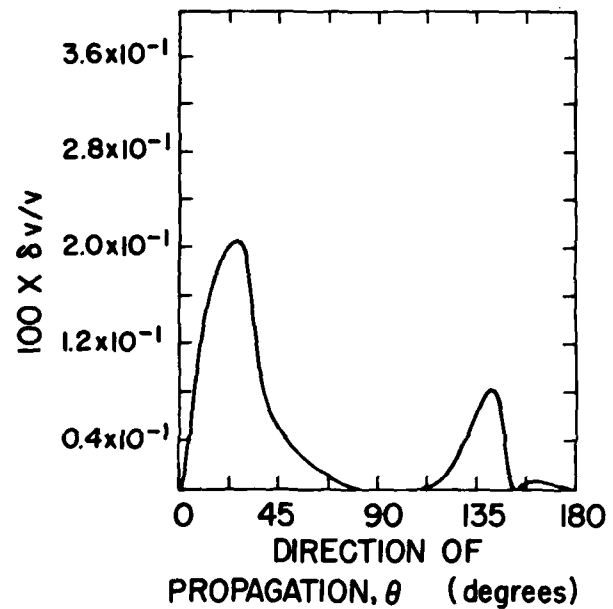


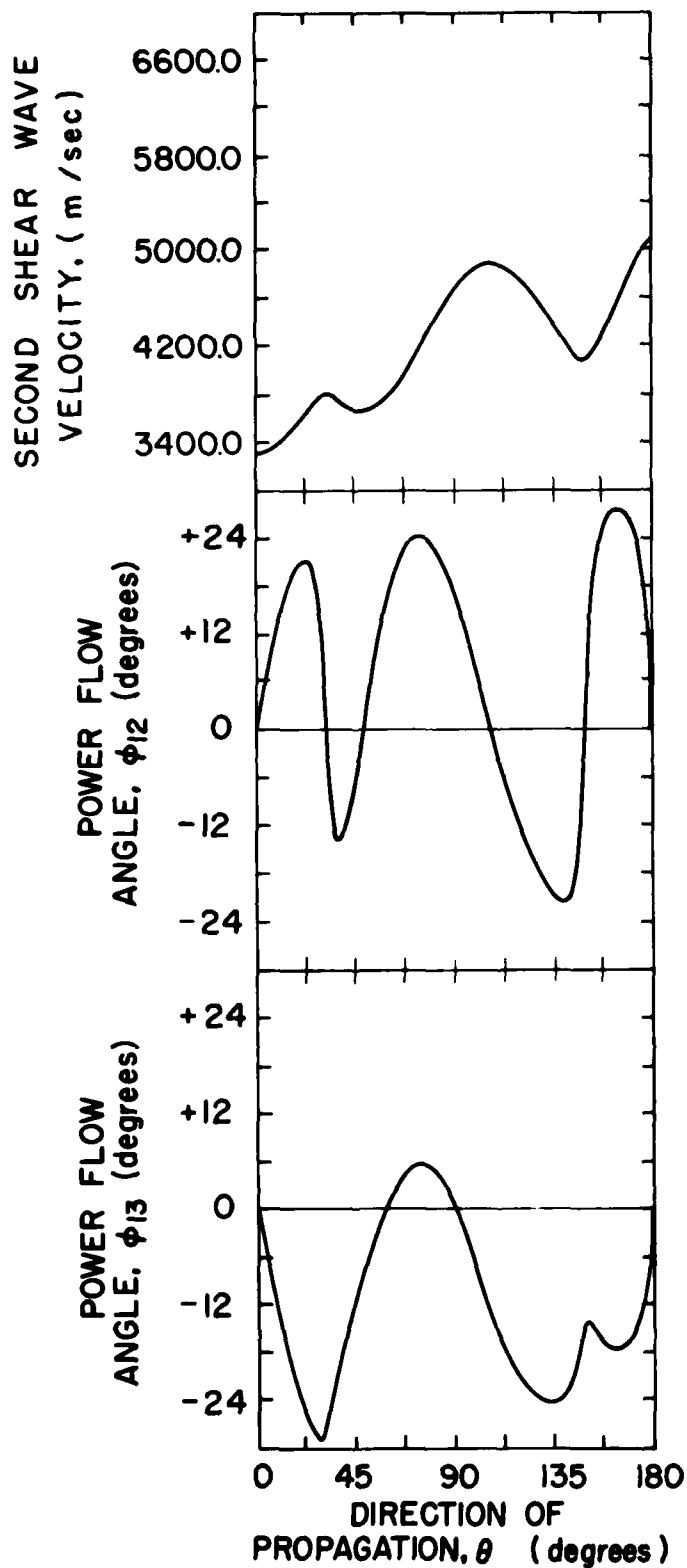
Y-PLANE
QUARTZ



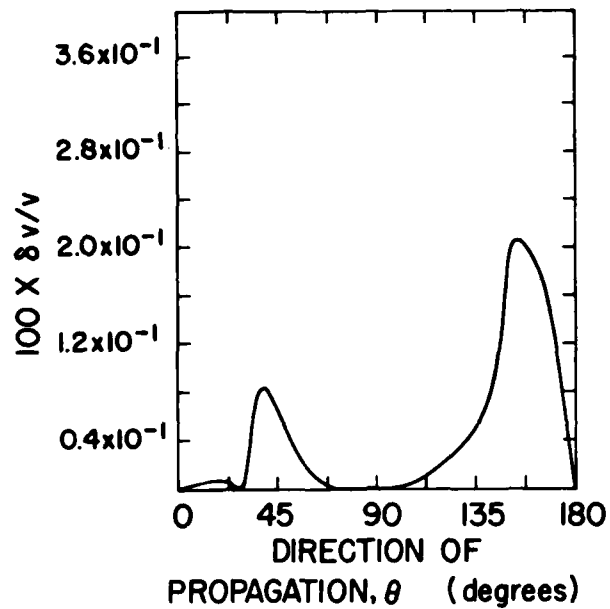


Y-PLANE QUARTZ

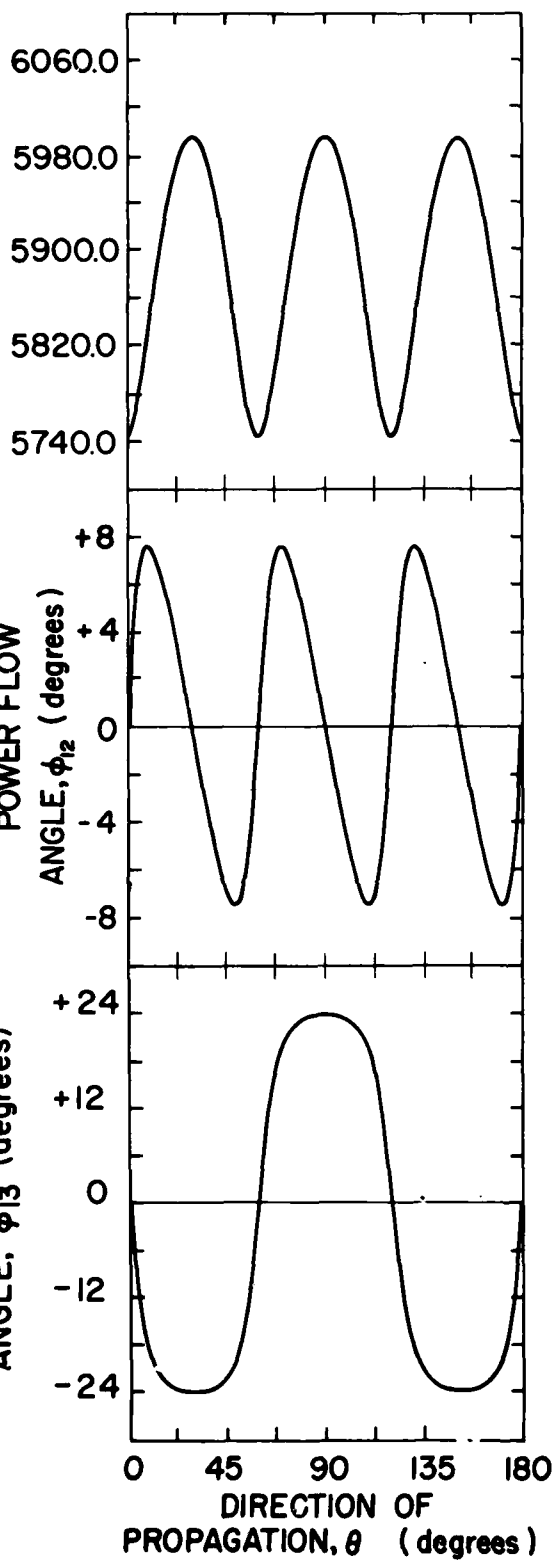




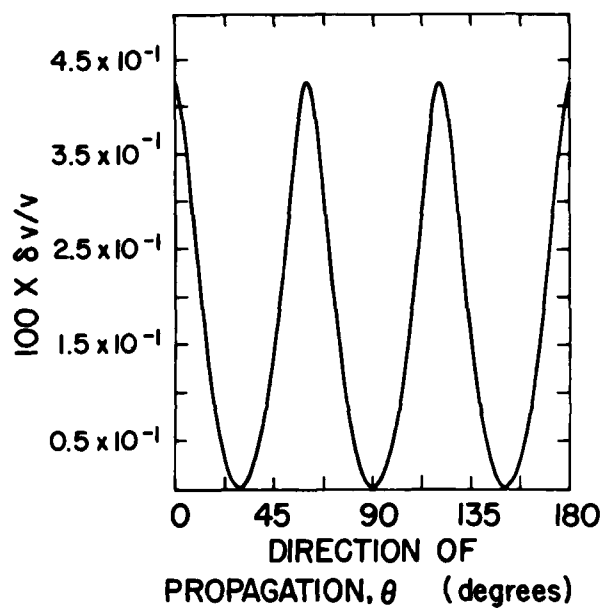
Y-PLANE QUARTZ

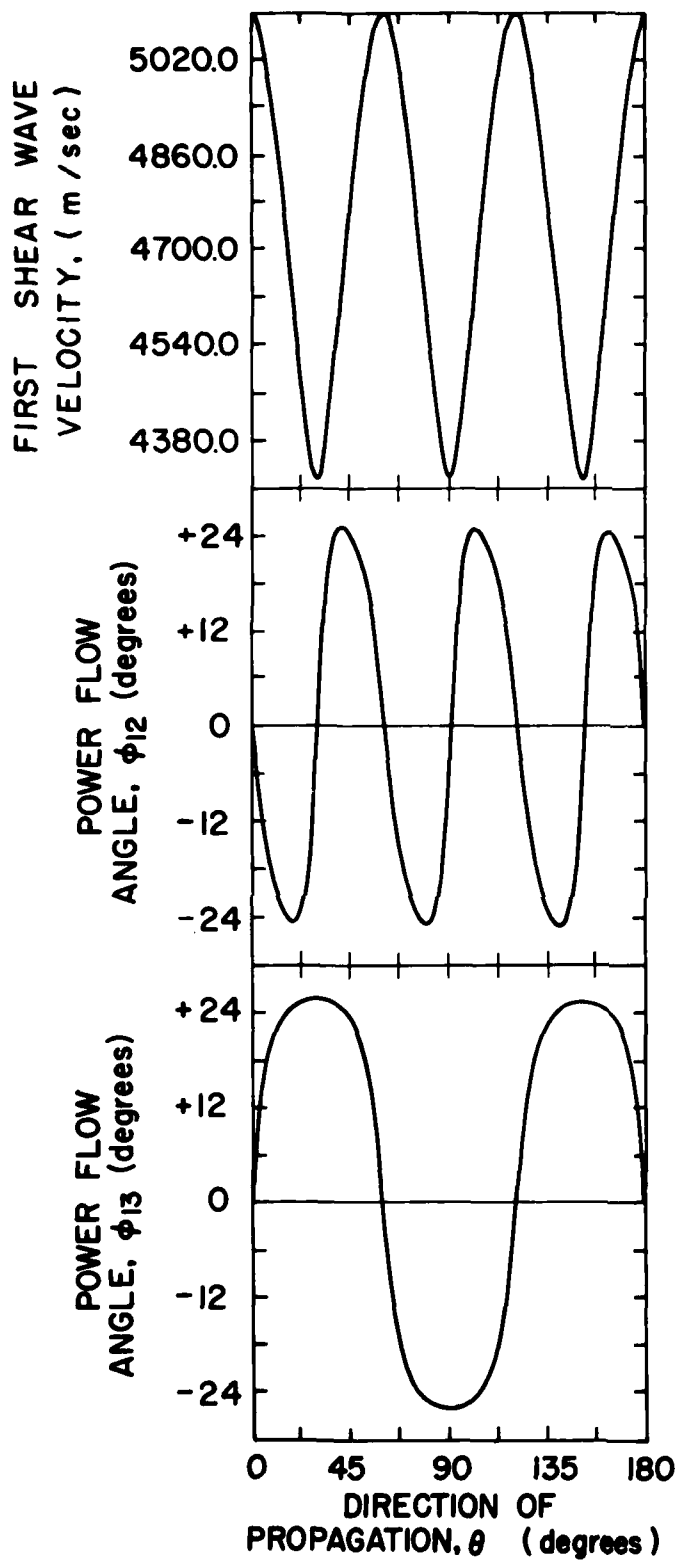


LONGITUDINAL WAVE
VELOCITY, (m / sec)

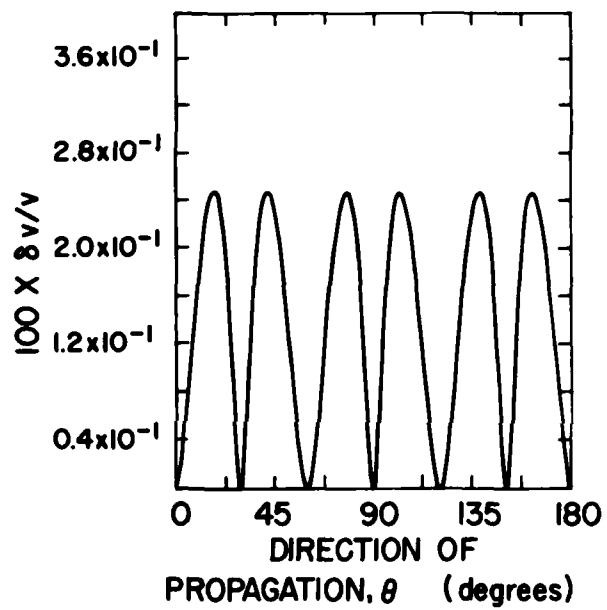


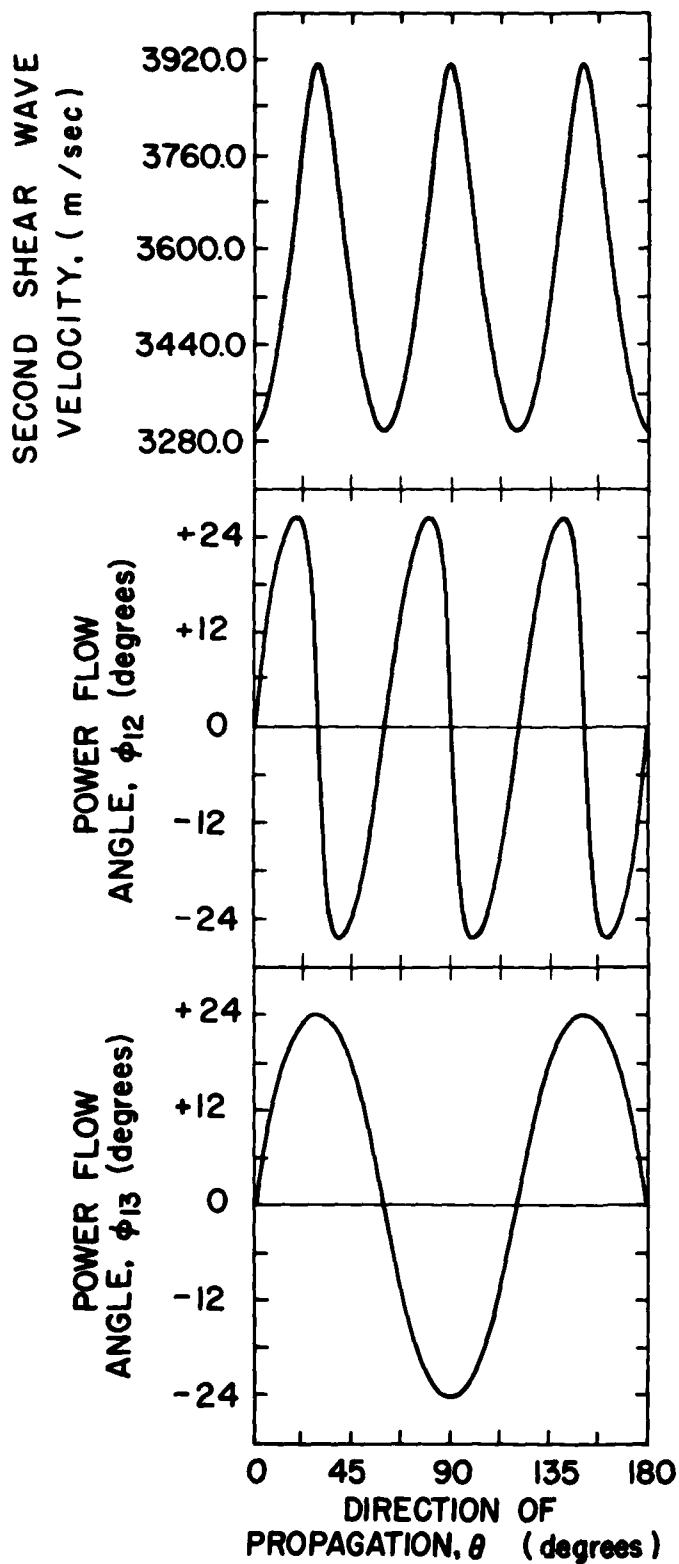
Z-PLANE
QUARTZ



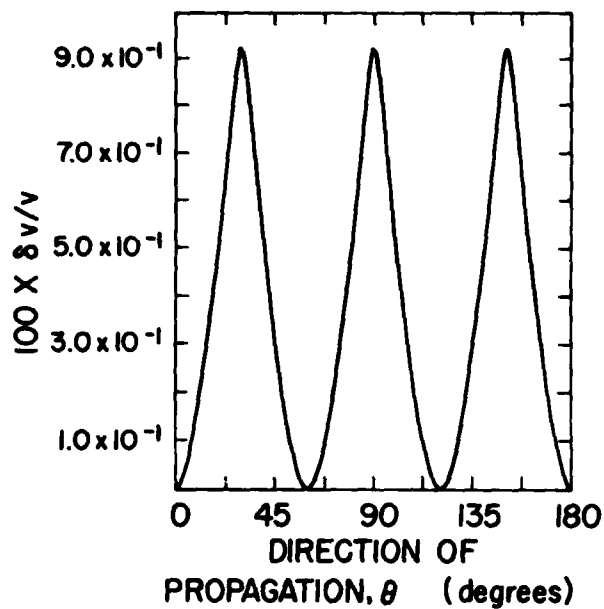


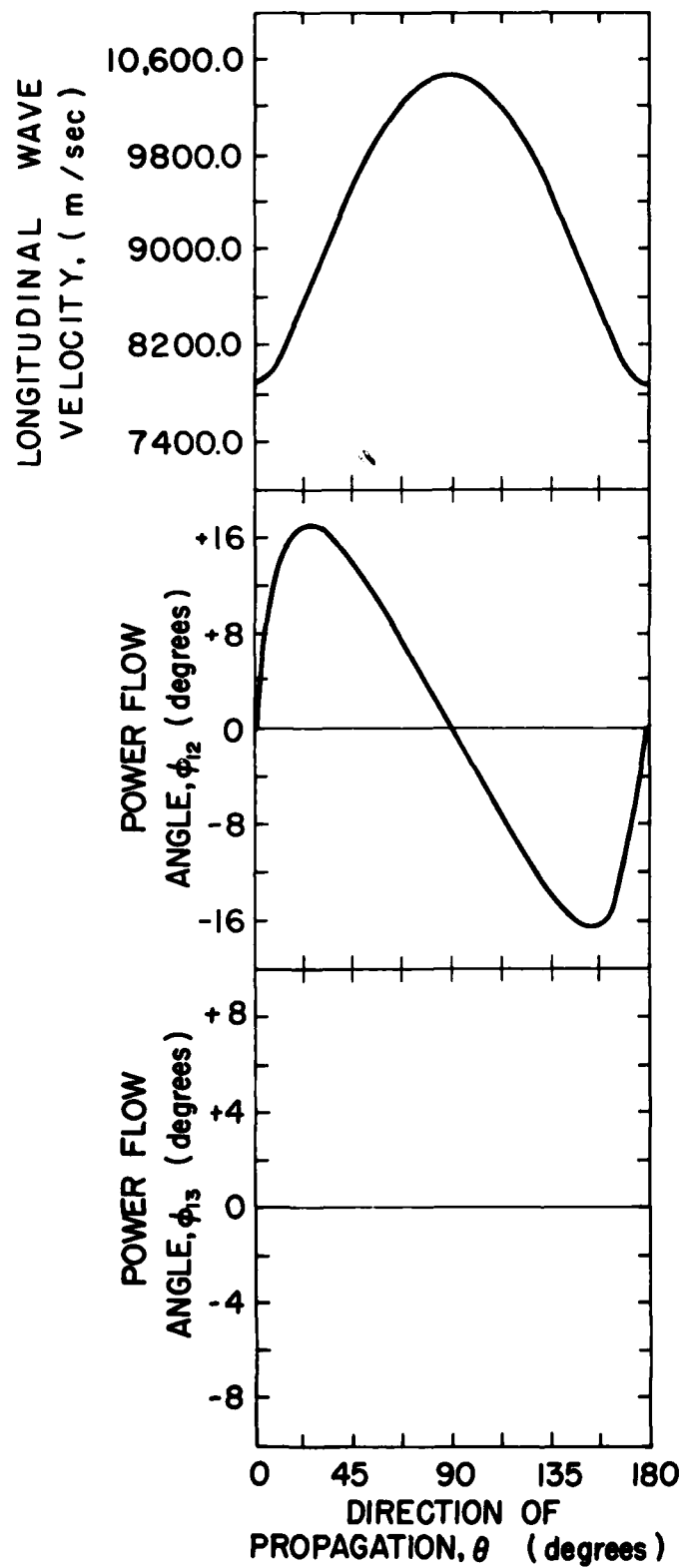
Z-PLANE QUARTZ





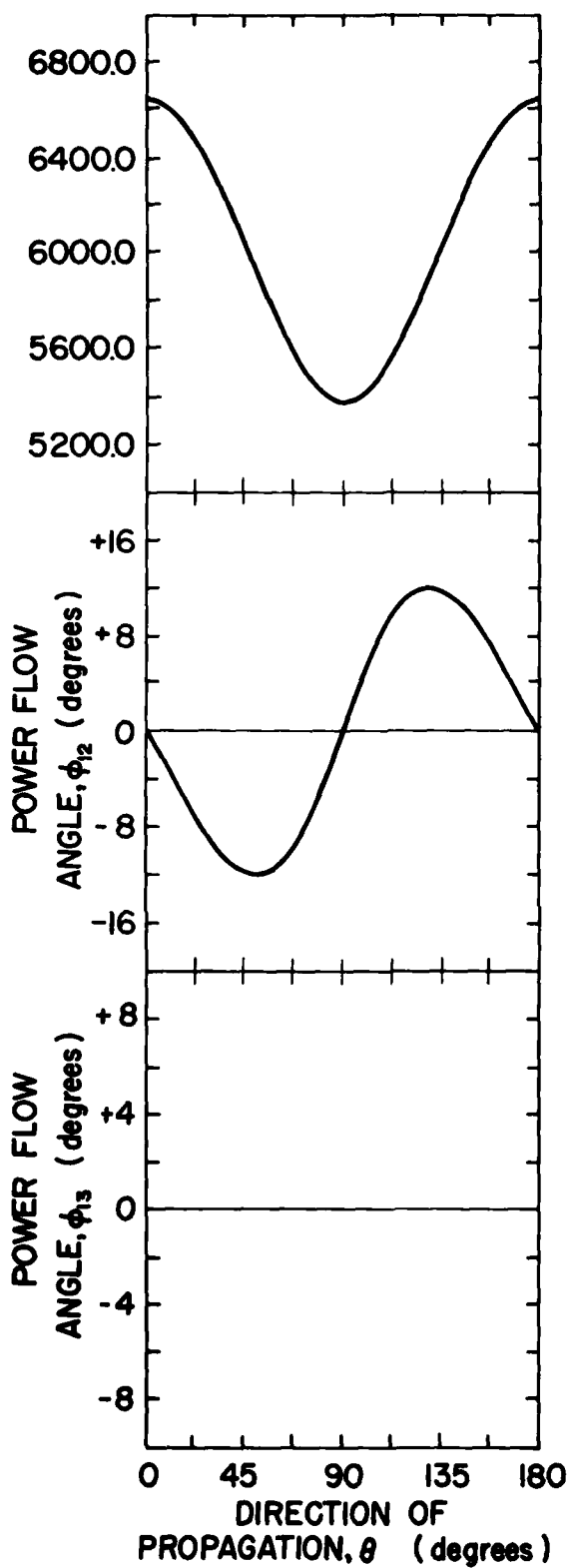
Z-PLANE QUARTZ





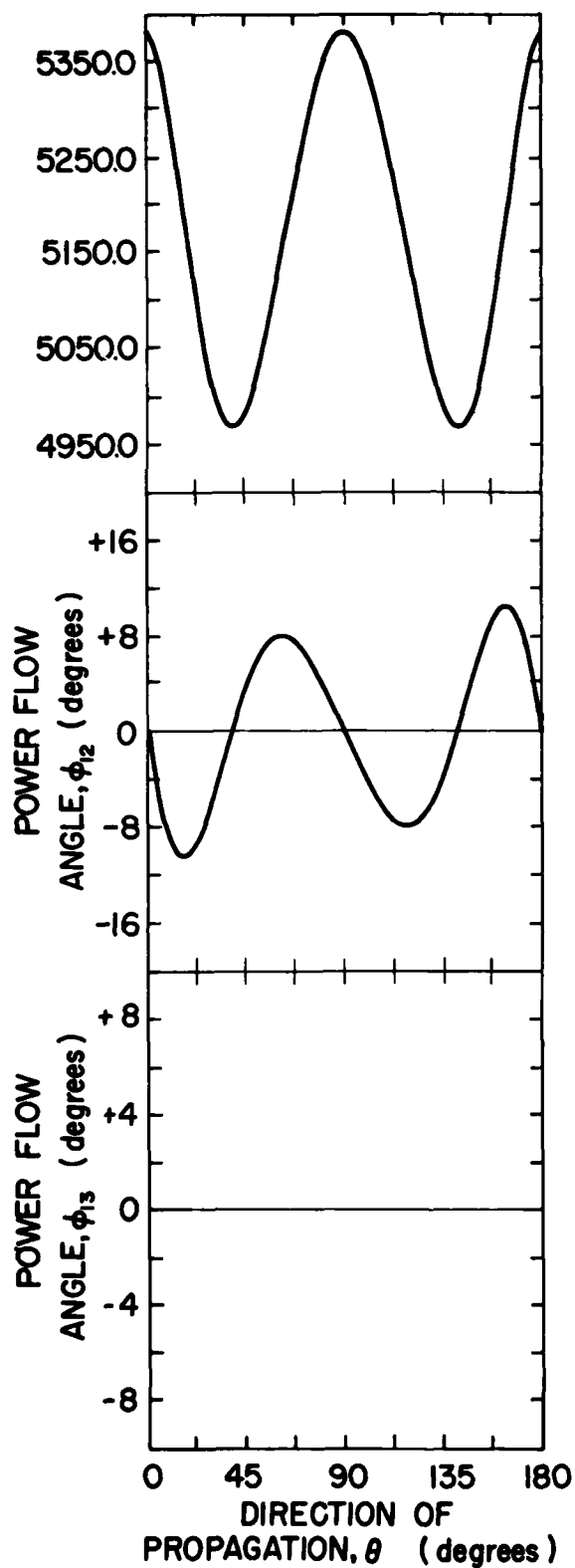
X-PLANE +Y-PLANE
RUTILE

FIRST SHEAR WAVE
VELOCITY, (m/sec)

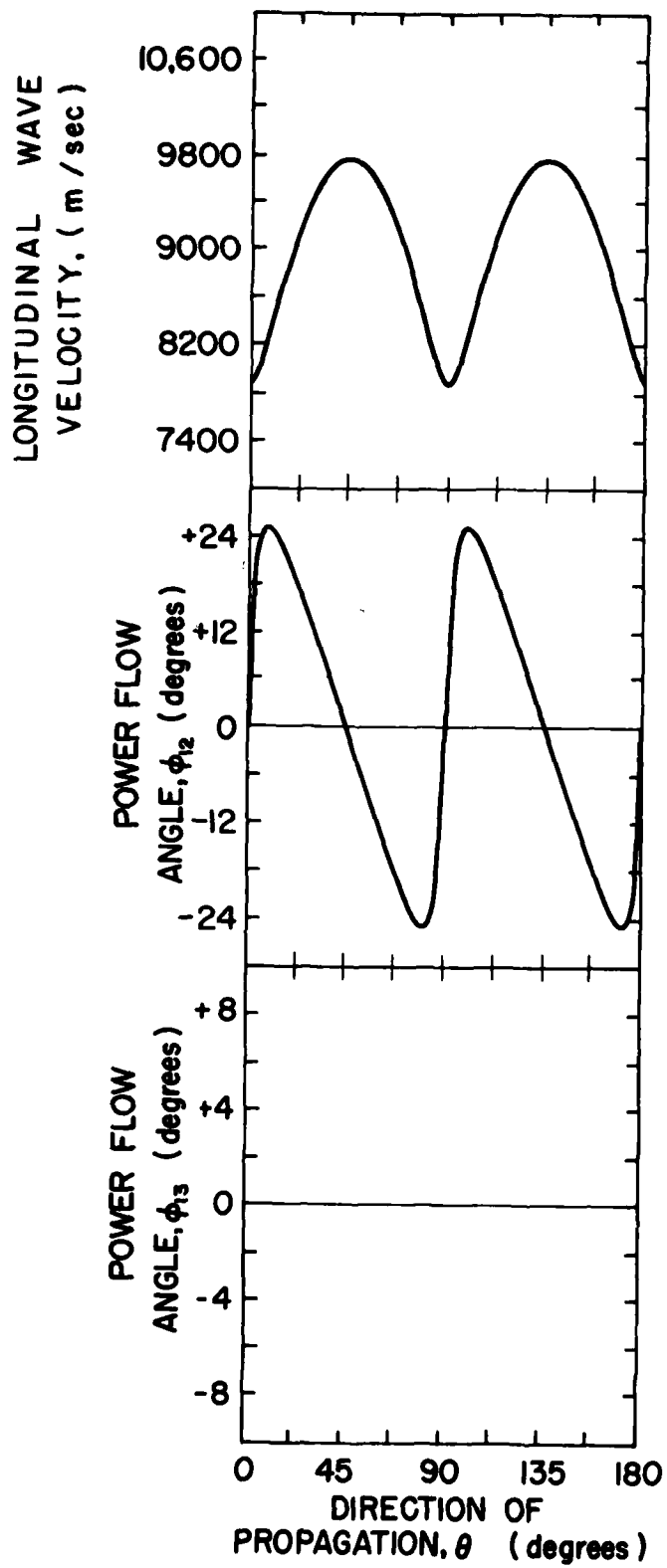


X-PLANE + Y-PLANE
RUTILE

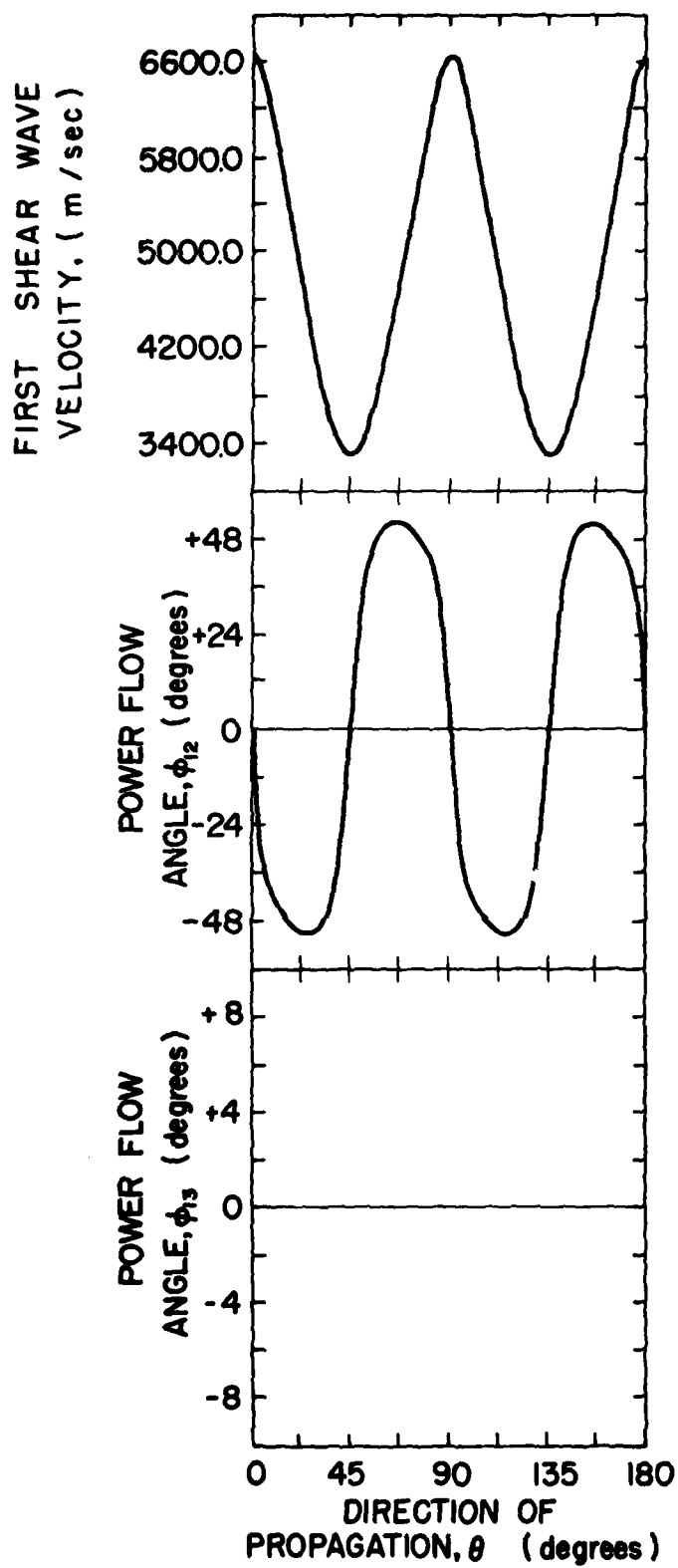
SECOND SHEAR WAVE
VELOCITY, (m / sec)



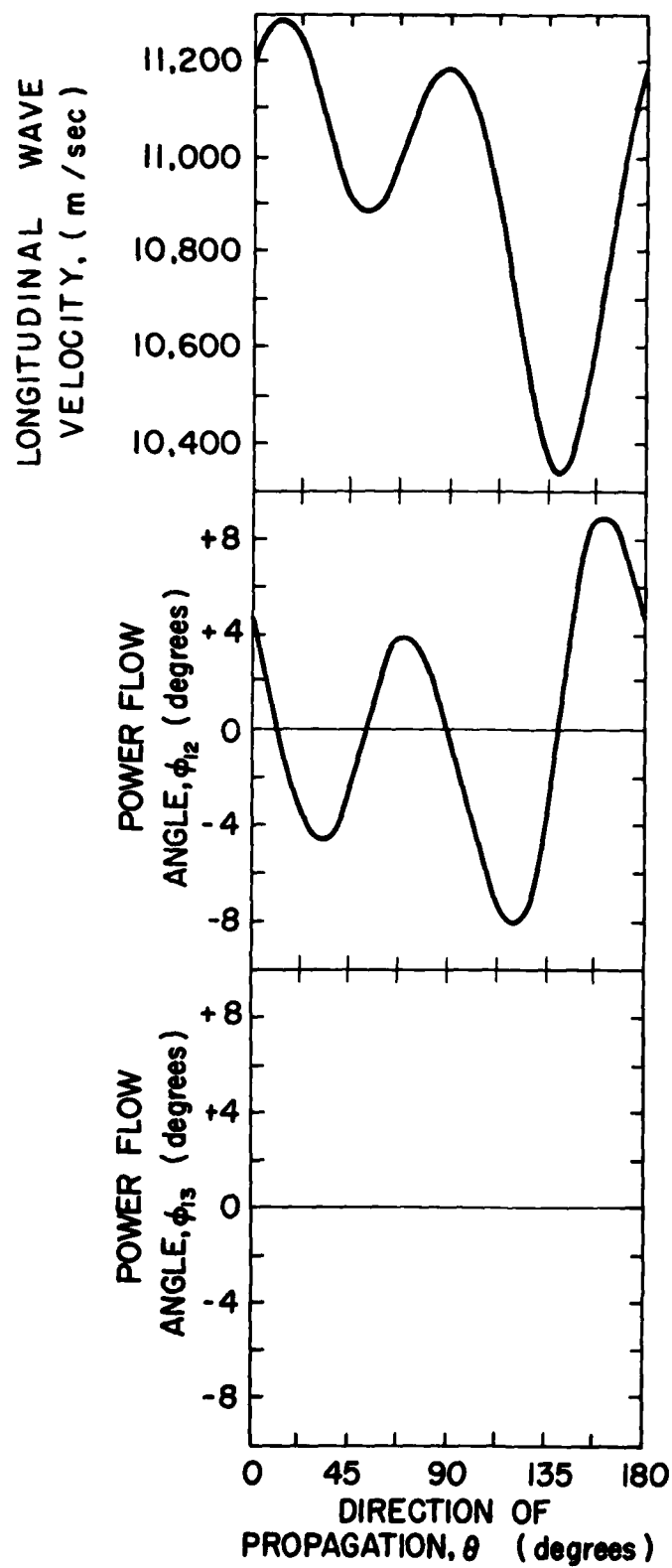
X-PLANE + Y-PLANE
RUTILE



Z-PLANE
RUTILE

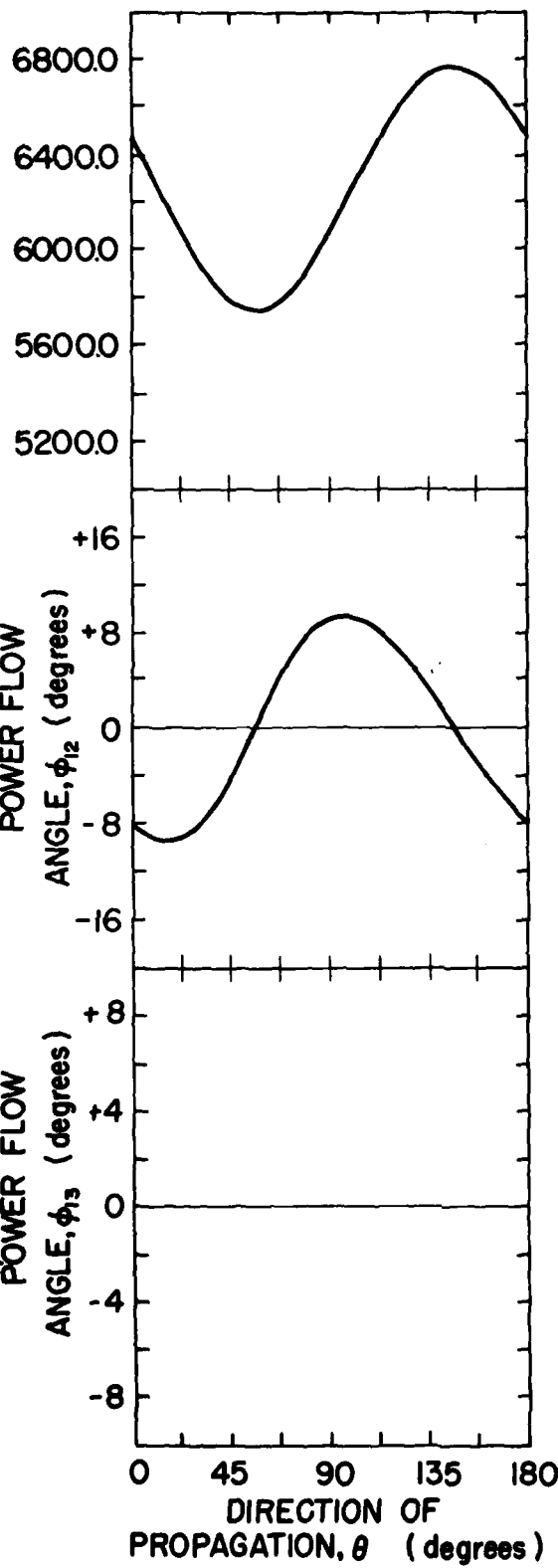


Z-PLANE
RUTILE



X - PLANE
SAPPHIRE

FIRST SHEAR WAVE
VELOCITY, (m / sec)



X-PLANE
SAPPHIRE

SECOND SHEAR WAVE
VELOCITY, (m / sec)

78000.0
74000.0
70000.0
66000.0
62000.0

X-PLANE
SAPPHIRE

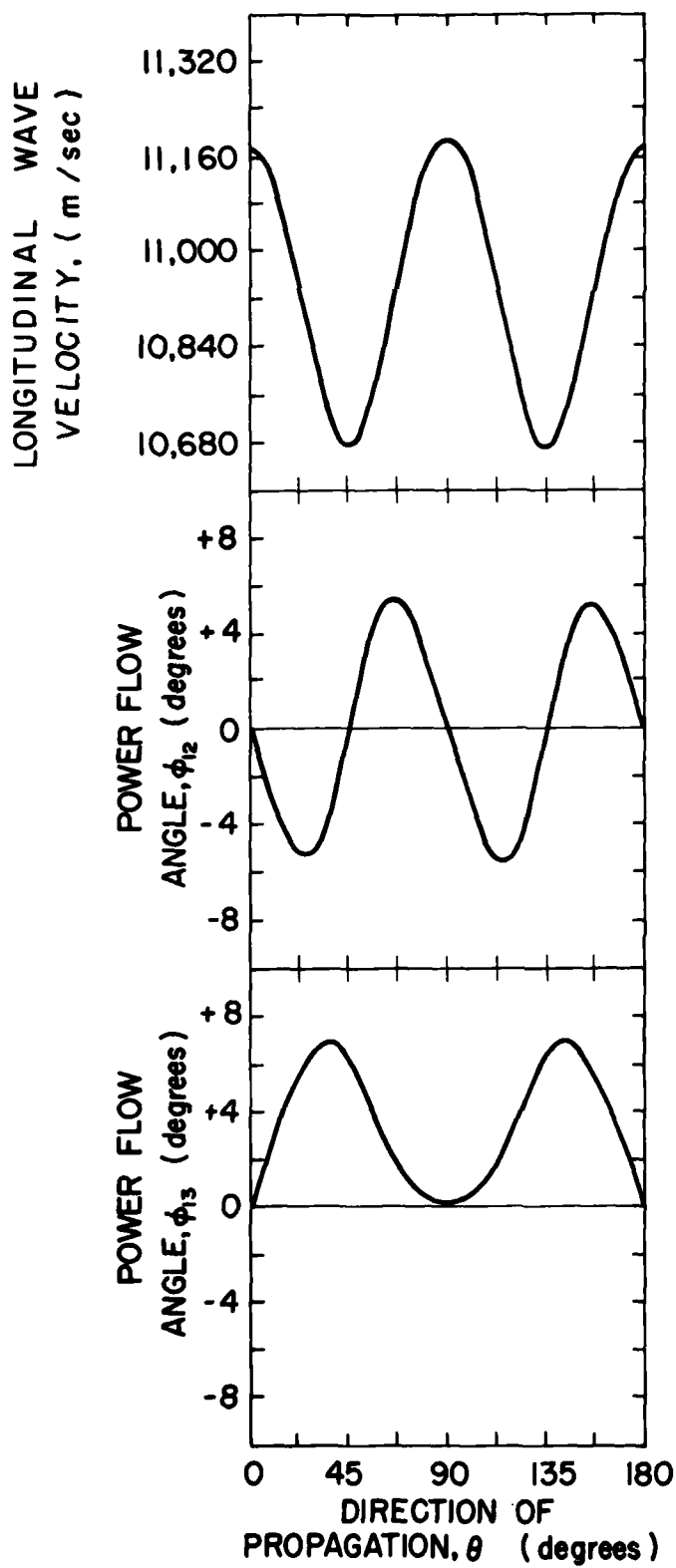
POWER FLOW
ANGLE, ϕ_2 (degrees)

+16
+8
0
-8
-16

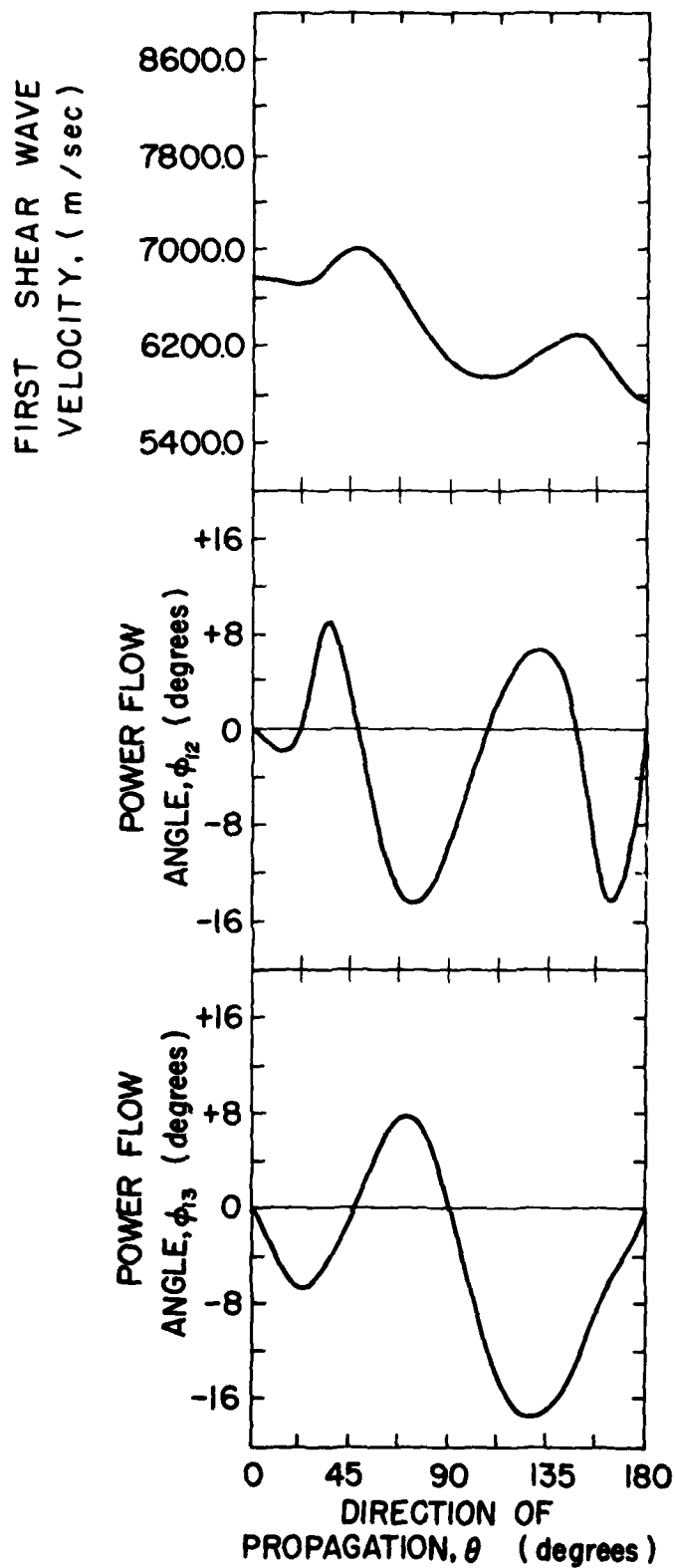
POWER FLOW
ANGLE, ϕ_3 (degrees)

+8
+4
0
-4
-8

0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

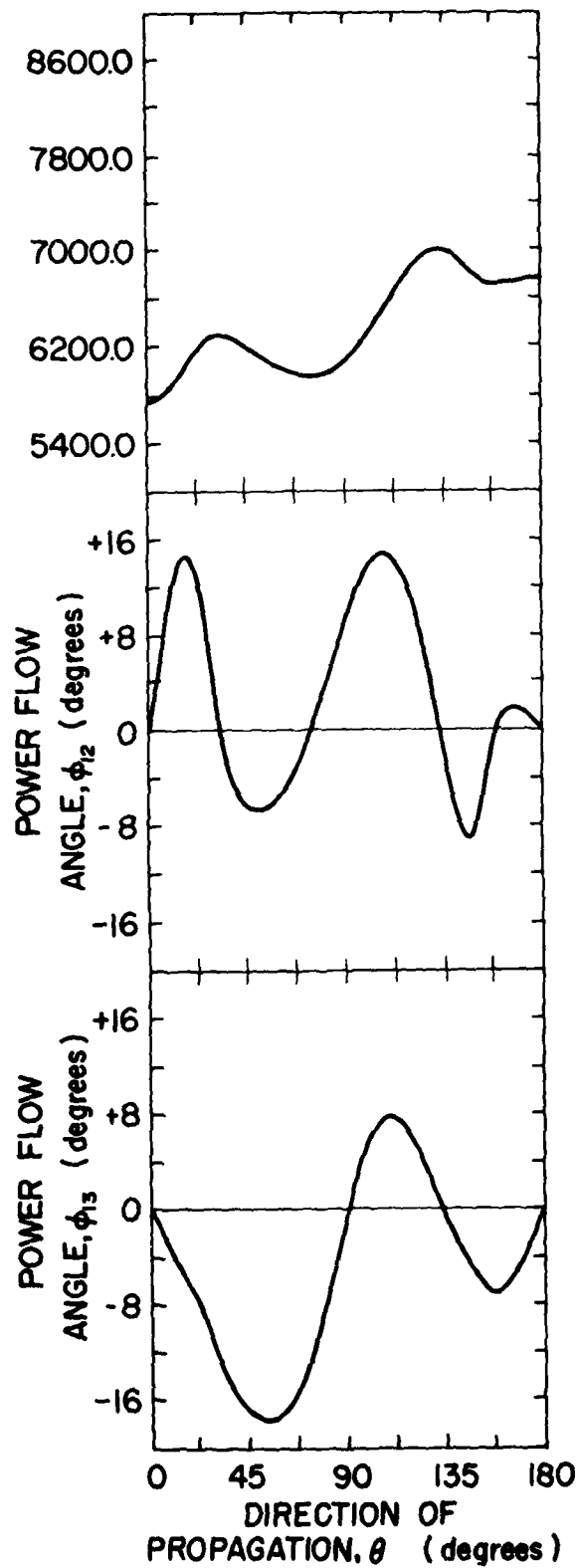


Y-PLANE
SAPPHIRE



Y-PLANE
SAPPHIRE

SECOND SHEAR WAVE
VELOCITY, (m / sec)



Y-PLANE
SAPPHIRE

AD-A090 947

ROME AIR DEVELOPMENT CENTER GRIFFISS AFB NY F/G 20/1
MICROWAVE ACOUSTICS HANDBOOK, VOLUME 3. BULK WAVE VELOCITIES.(U)
MAY 80 A J SLOBODNIK, R T DELMONICO

UNCLASSIFIED

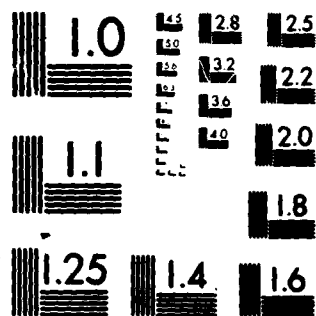
RADC-TR-80-188-VOL-3

NL

6

10

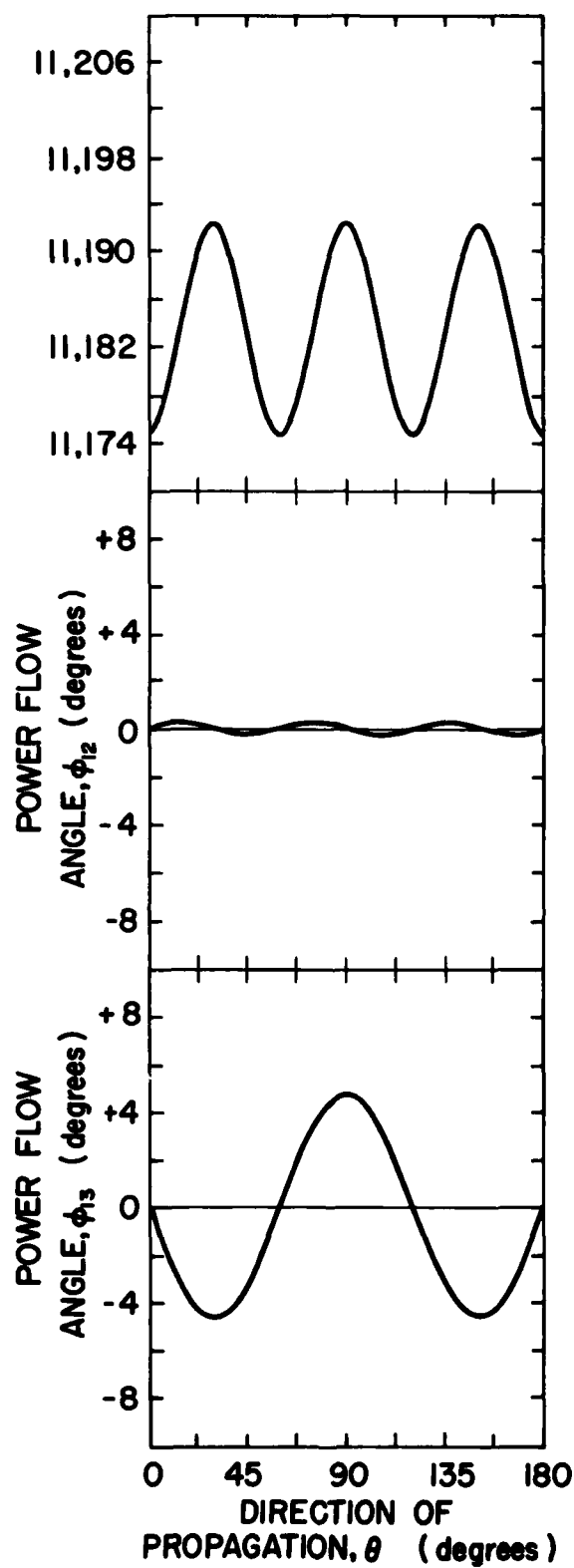
10



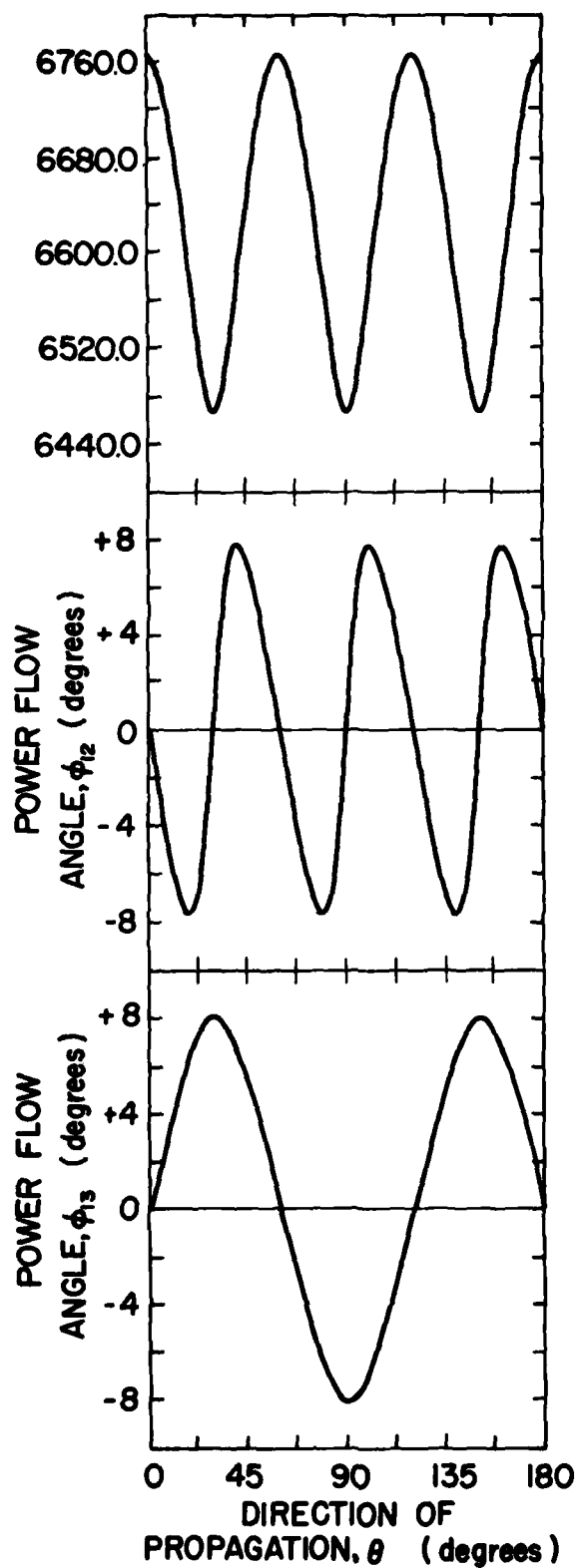
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

LONGITUDINAL WAVE
VELOCITY, (m / sec)

Z-PLANE
SAPPHIRE

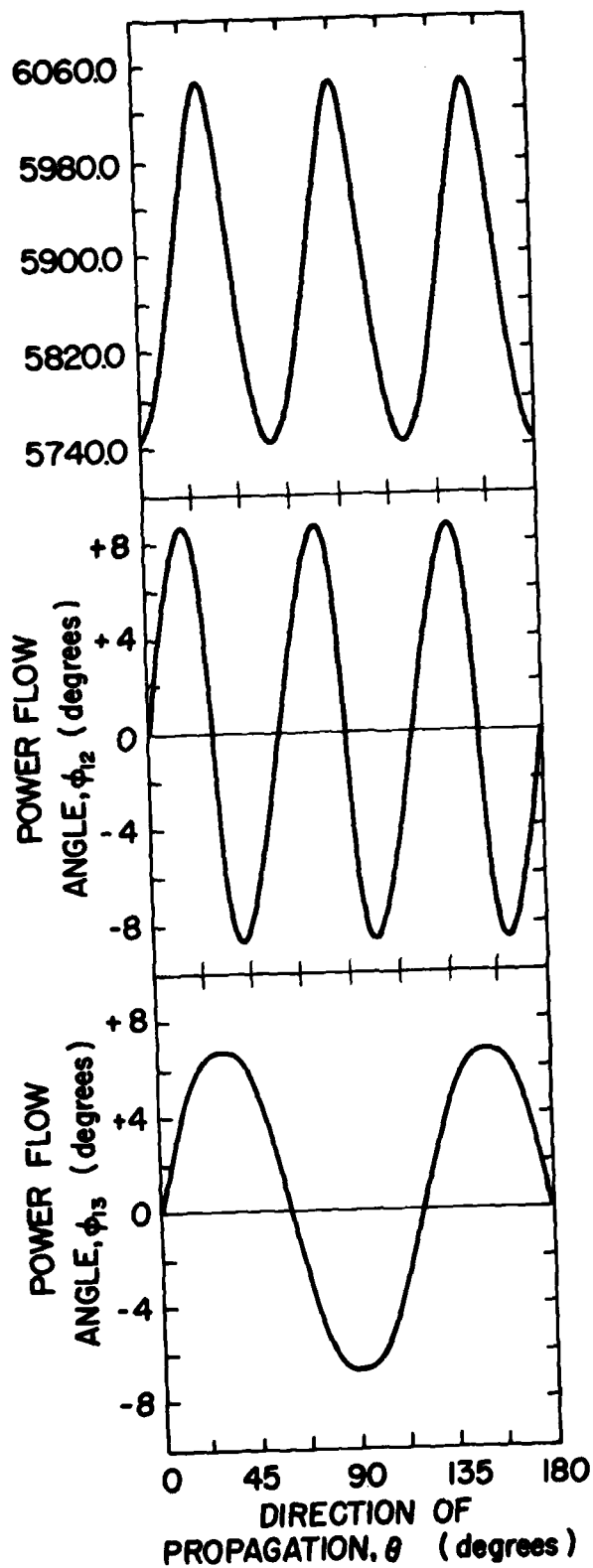


FIRST SHEAR WAVE
VELOCITY, (m/sec)

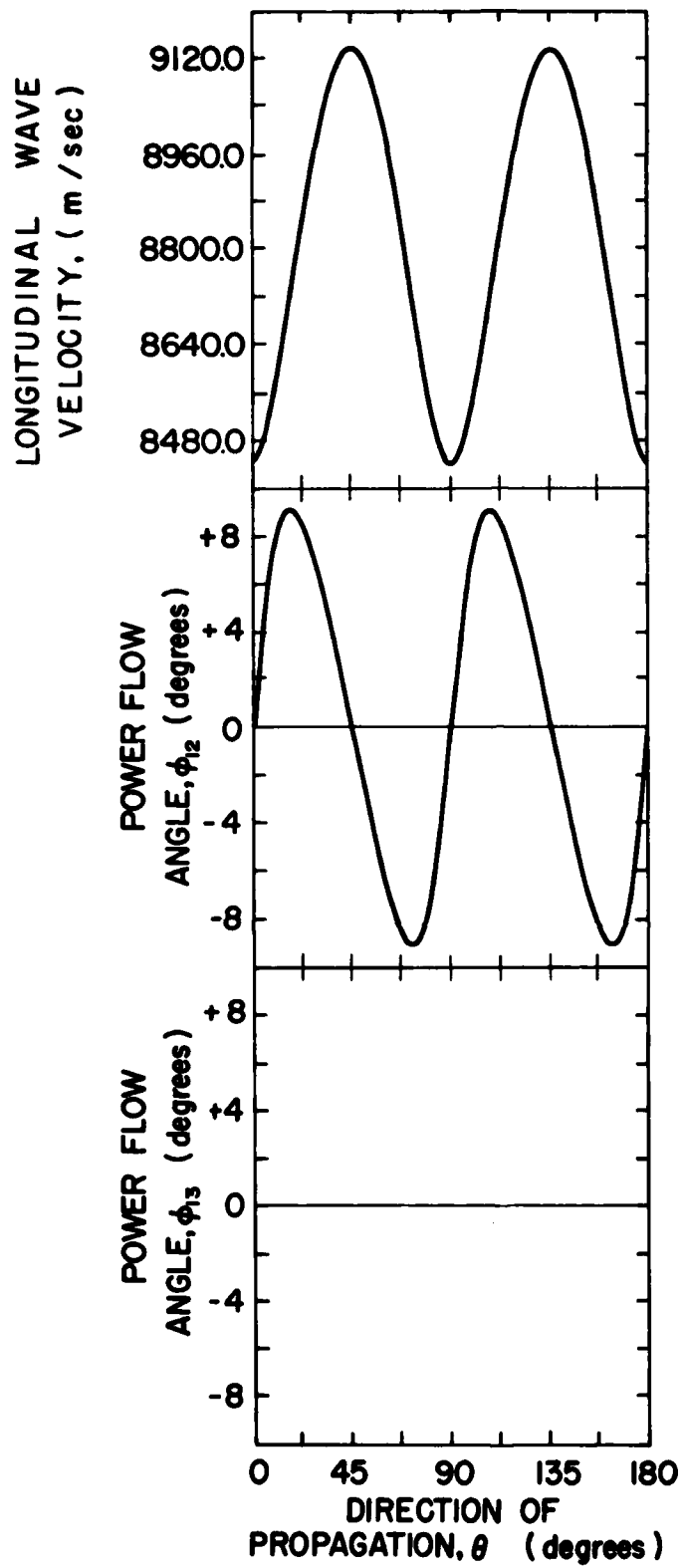


Z-PLANE
SAPPHIRE

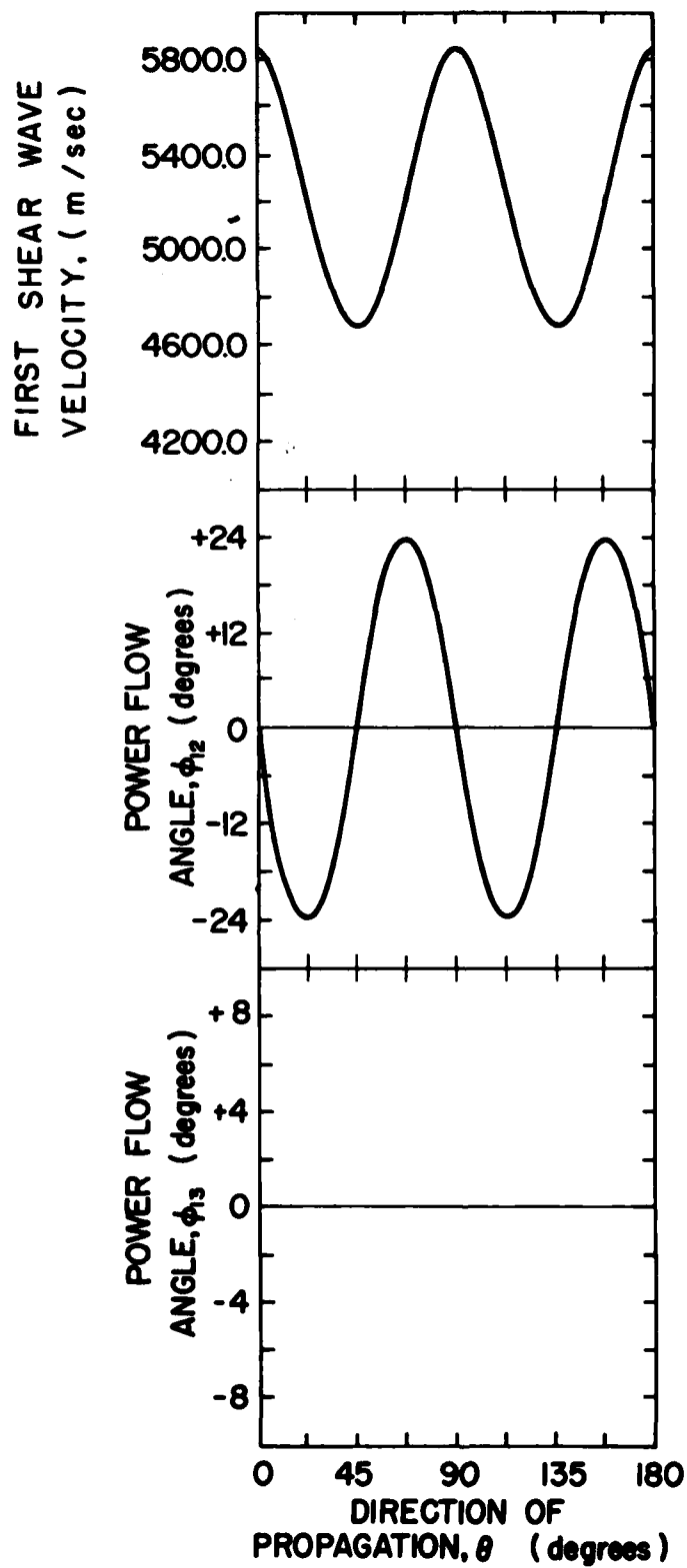
SECOND SHEAR WAVE
VELOCITY, (m/sec)



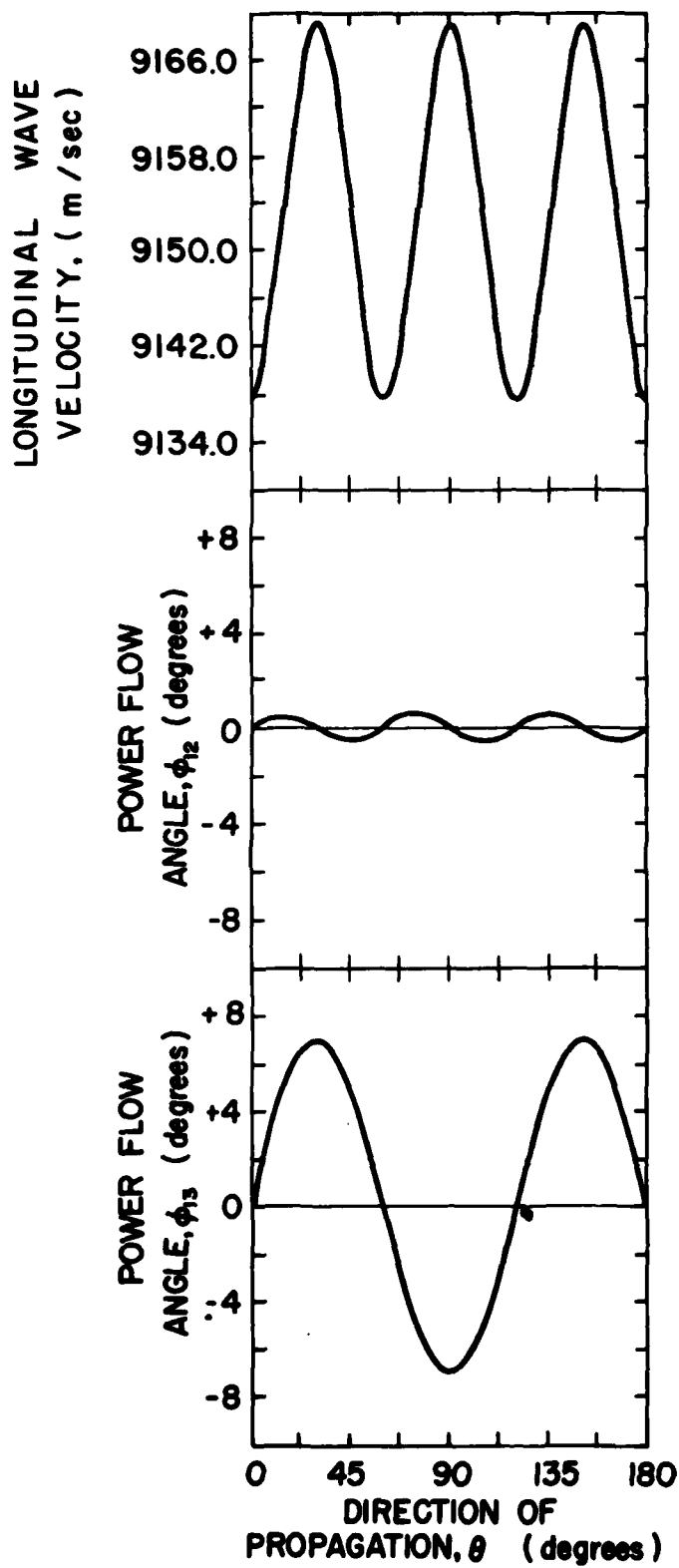
Z-PLANE
SAPPHIRE



Z-PLANE
SILICON

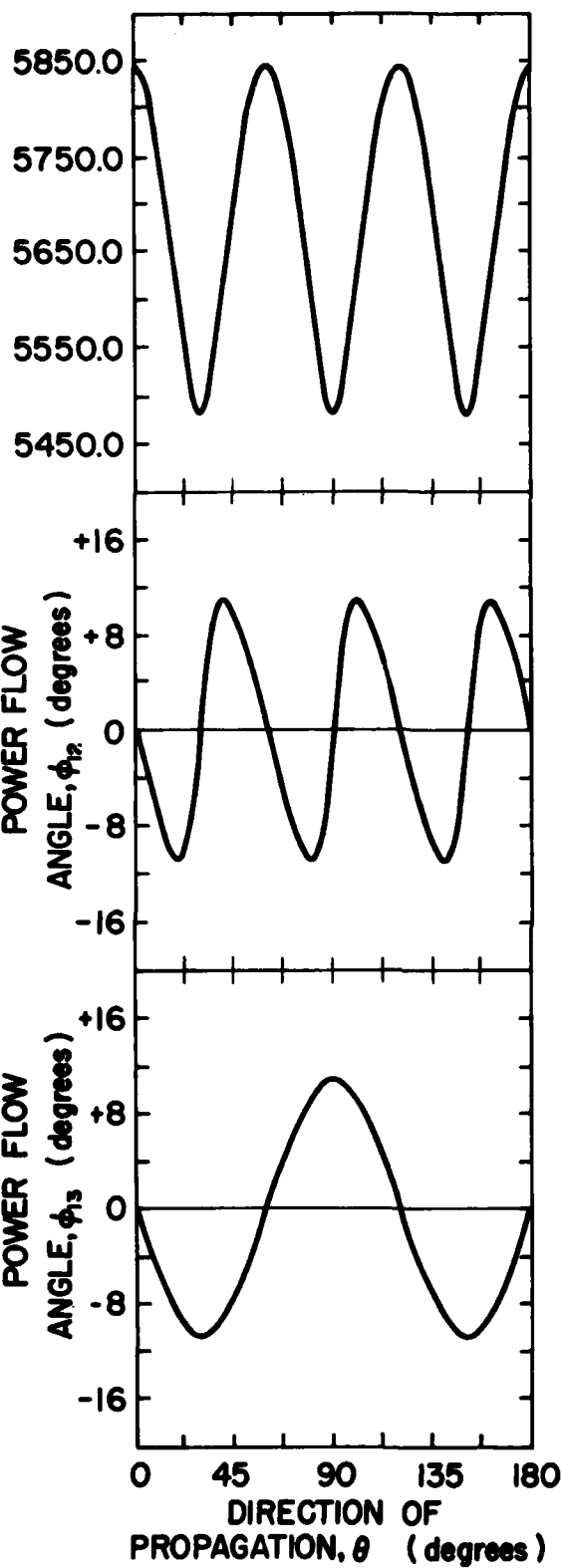


Z-PLANE
SILICON



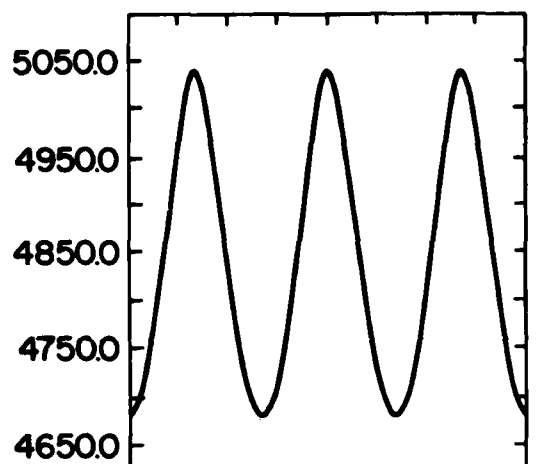
III-PLANE
SILICON

FIRST SHEAR WAVE
VELOCITY, (m / sec)



III - PLANE
SILICON

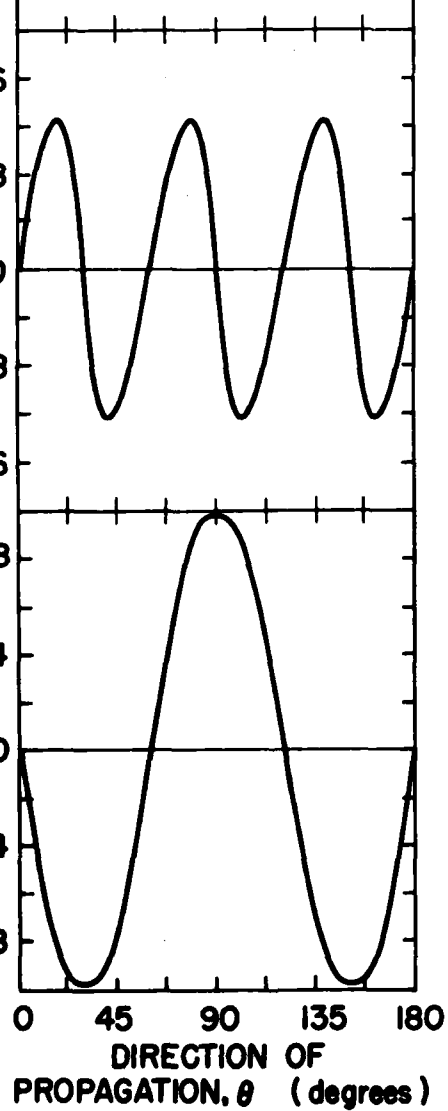
SECOND SHEAR WAVE
VELOCITY, (m/sec)

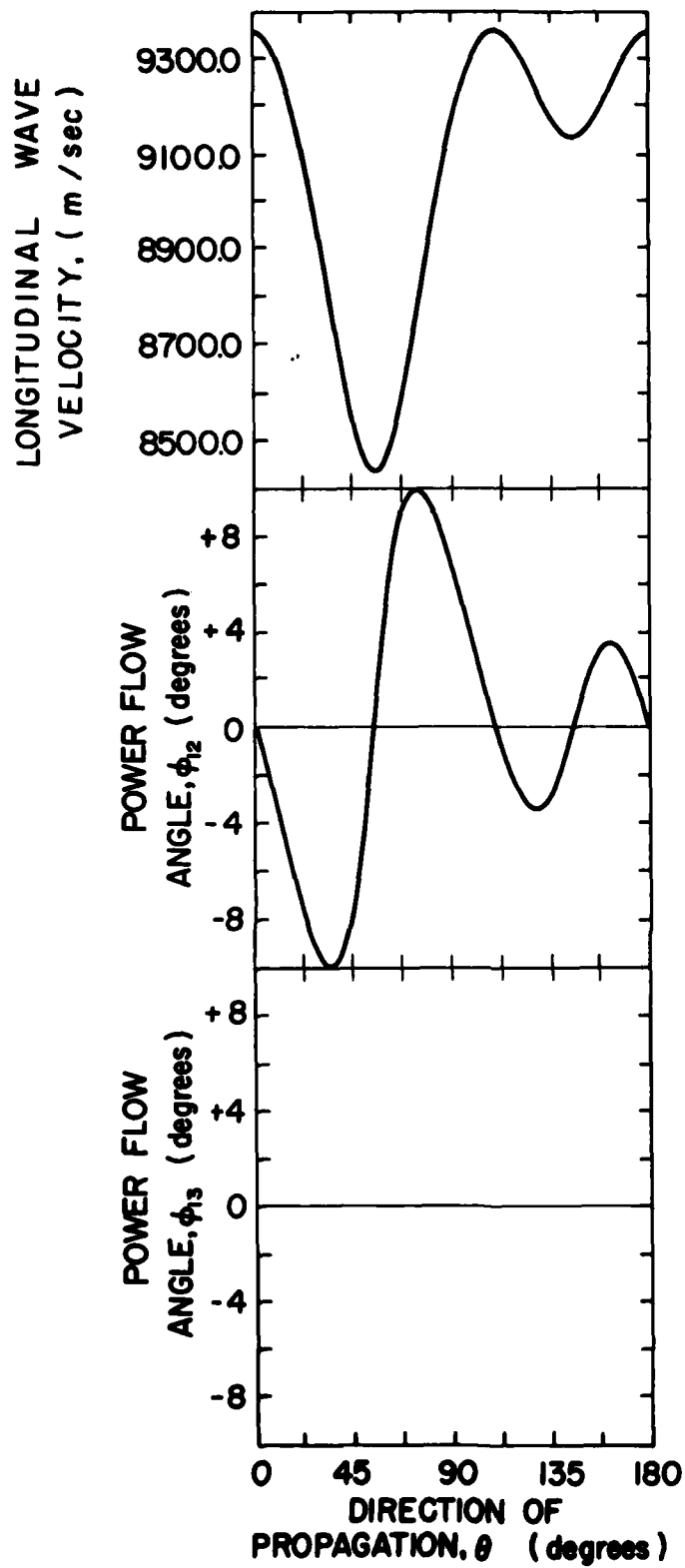


III-PLANE
SILICON

POWER FLOW
ANGLE, ϕ_{12} (degrees)

POWER FLOW
ANGLE, ϕ_{13} (degrees)





110-PLANE
SILICON

FIRST SHEAR WAVE
VELOCITY, (m / sec)

58000
54000
50000
46000
42000

110-PLANE
SILICON

POWER FLOW
ANGLE, ϕ_2 (degrees)
+16
+8
0
-8
-16

POWER FLOW
ANGLE, ϕ_3 (degrees)
+8
+4
0
-4
-8

0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

SECOND SHEAR WAVE
VELOCITY, (m/sec)

5800.0
5400.0
5000.0
4600.0
4200.0

POWER FLOW

ANGLE, ϕ_{12} (degrees)

+16
+8
0
-8
-16

POWER FLOW

ANGLE, ϕ_{13} (degrees)

+8
+4
0
-4
-8

0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

110-PLANE
SILICON

LONGITUDINAL WAVE
VELOCITY, (m / sec)

11,600
10,800
10,000
9,200
8,400

POWER FLOW
ANGLE, ϕ_{12} (degrees)

+16
+8
0
-8
-16

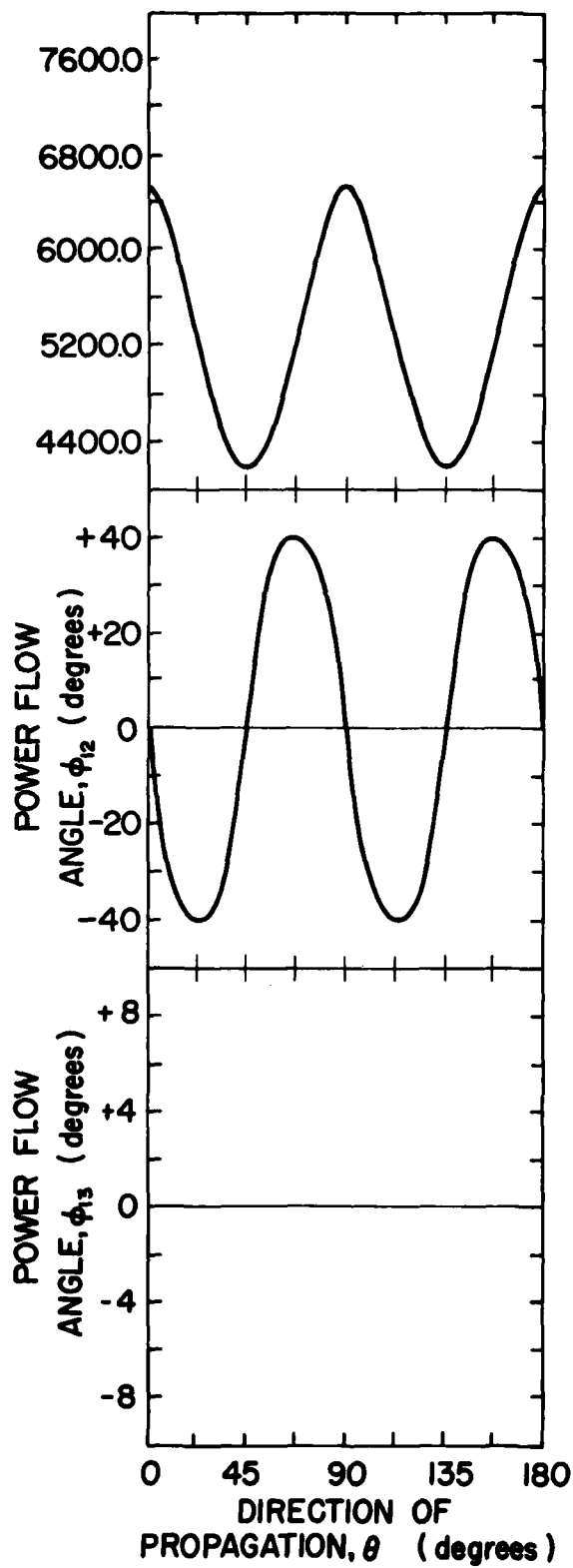
POWER FLOW
ANGLE, ϕ_{13} (degrees)

+8
+4
0
-4
-8

0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

Z-PLANE
SPINEL

SECOND SHEAR WAVE
VELOCITY, (m / sec)



Z-PLANE
SPINEL

LONGITUDINAL WAVE
VELOCITY, (m / sec)

10,240
10,220
10,200
10,180
10,160

POWER FLOW
ANGLE, ϕ_2 (degrees)
+8
+4
0
-4
-8

POWER FLOW
ANGLE, ϕ_3 (degrees)
+16
+8
0
-8
-16

0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

III-PLANE
SPINEL

FIRST SHEAR WAVE
VELOCITY, (m/sec)

6520.0
6360.0
6200.0
6040.0
5880.0

POWER FLOW

ANGLE, ϕ_2 (degrees)

+16
+8
0
-8
-16

POWER FLOW

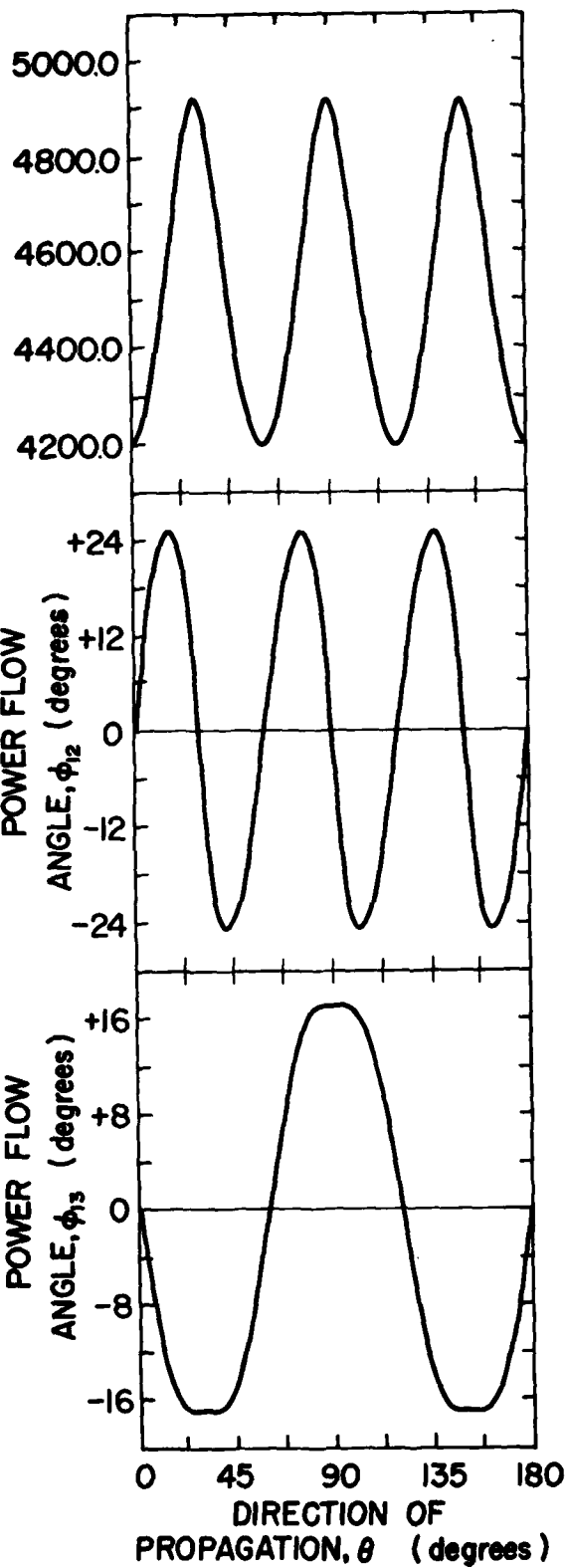
ANGLE, ϕ_3 (degrees)

+16
+8
0
-8
-16

0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

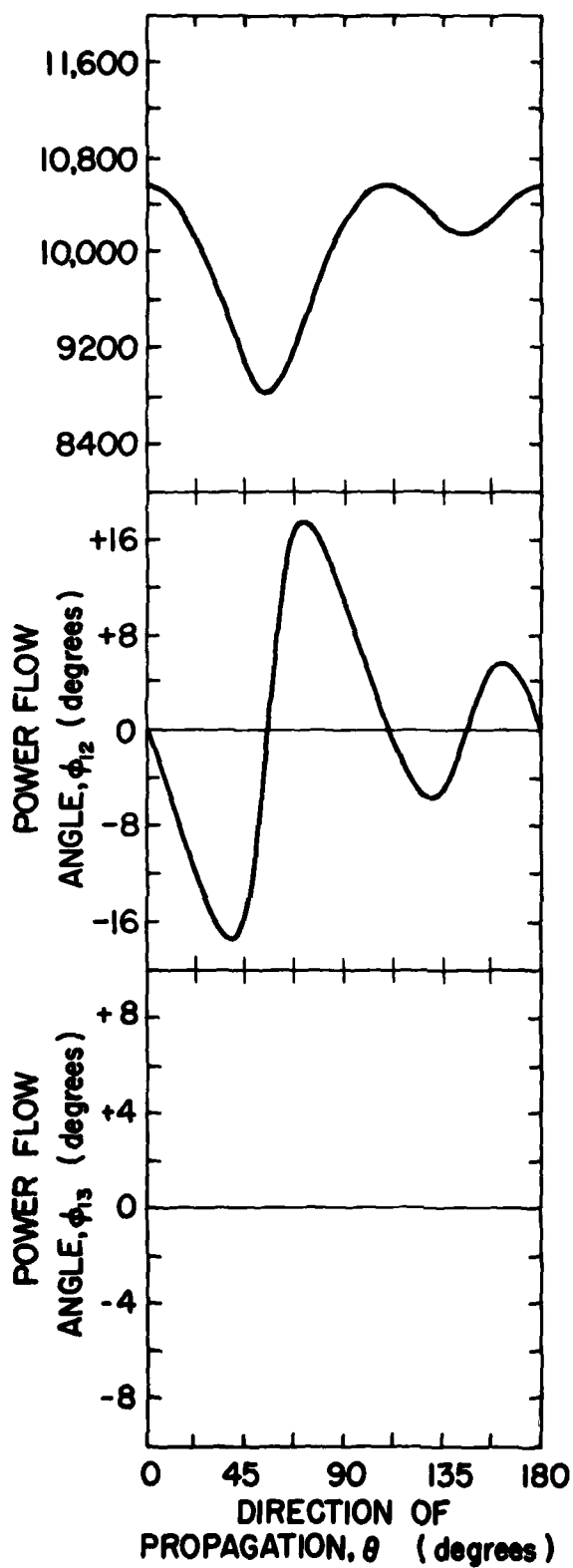
III - PLANE
SPINEL

SECOND SHEAR WAVE
VELOCITY, (m/sec)

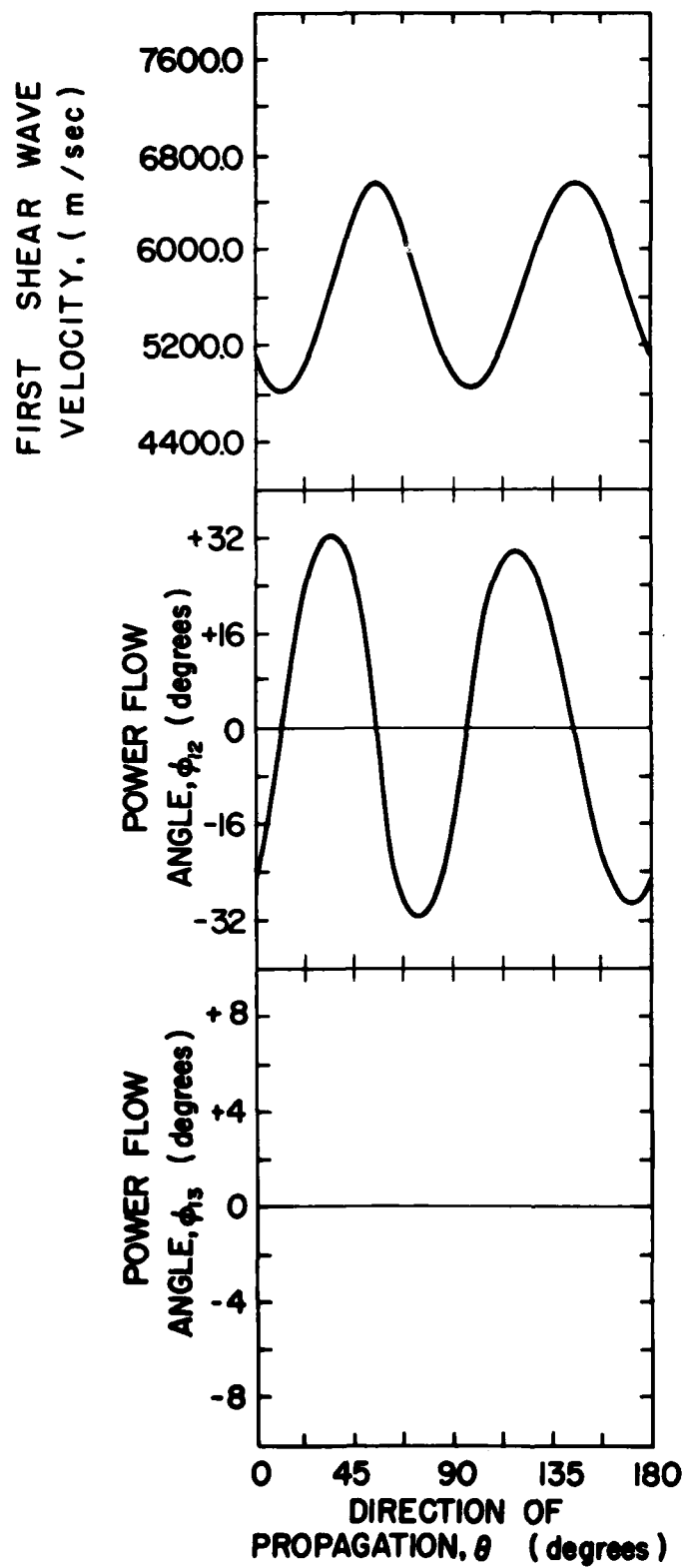


III-PLANE
SPINEL

LONGITUDINAL WAVE
VELOCITY, (m / sec)

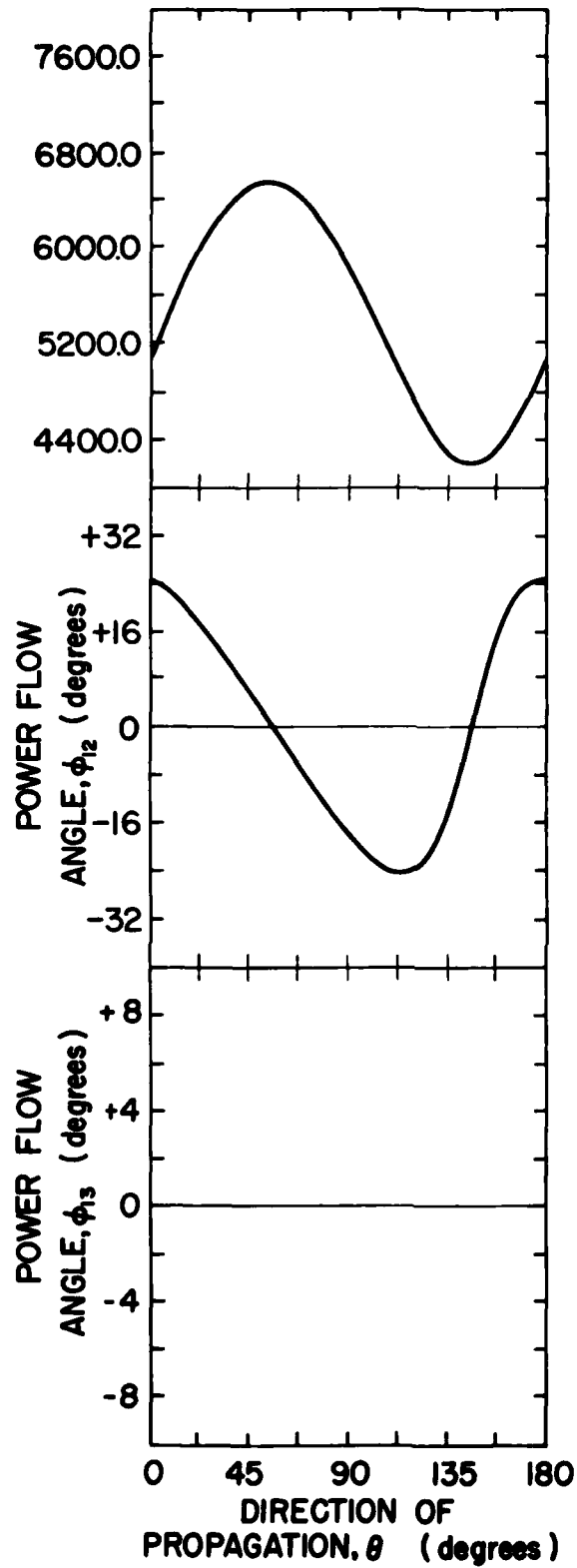


110-PLANE
SPINEL

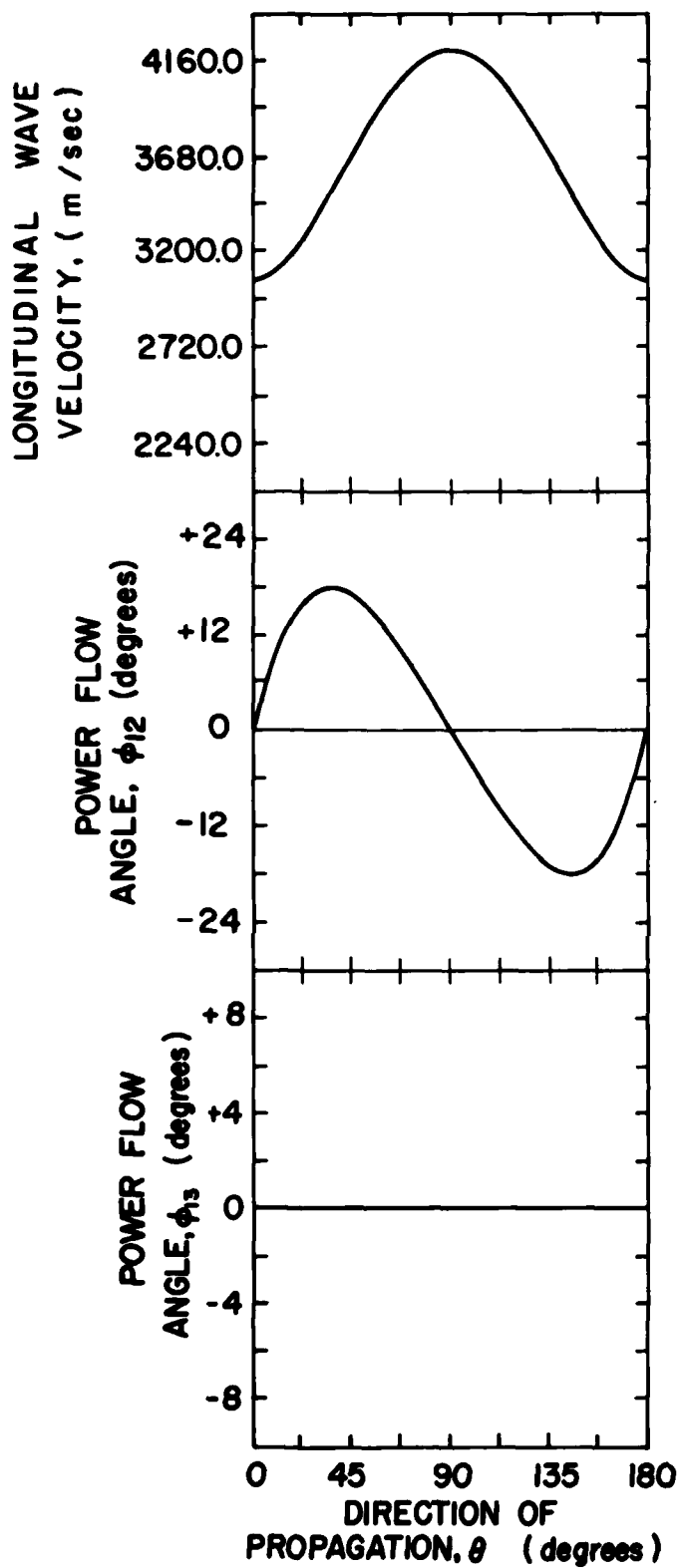


IIO-PLANE
SPINEL

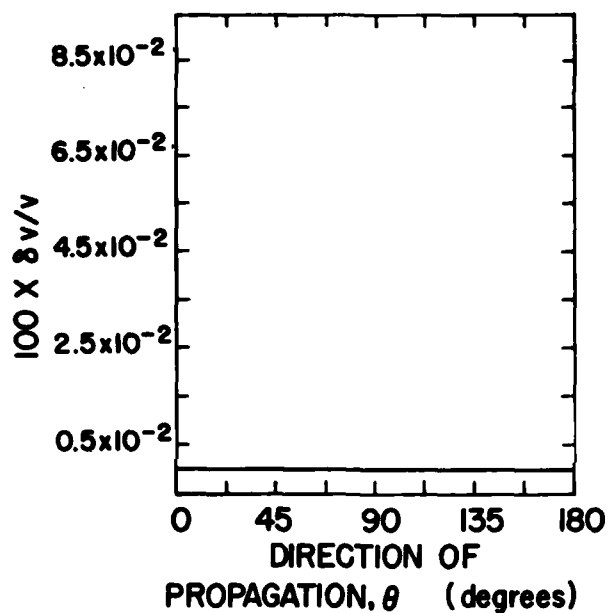
SECOND SHEAR WAVE
VELOCITY, (m / sec)

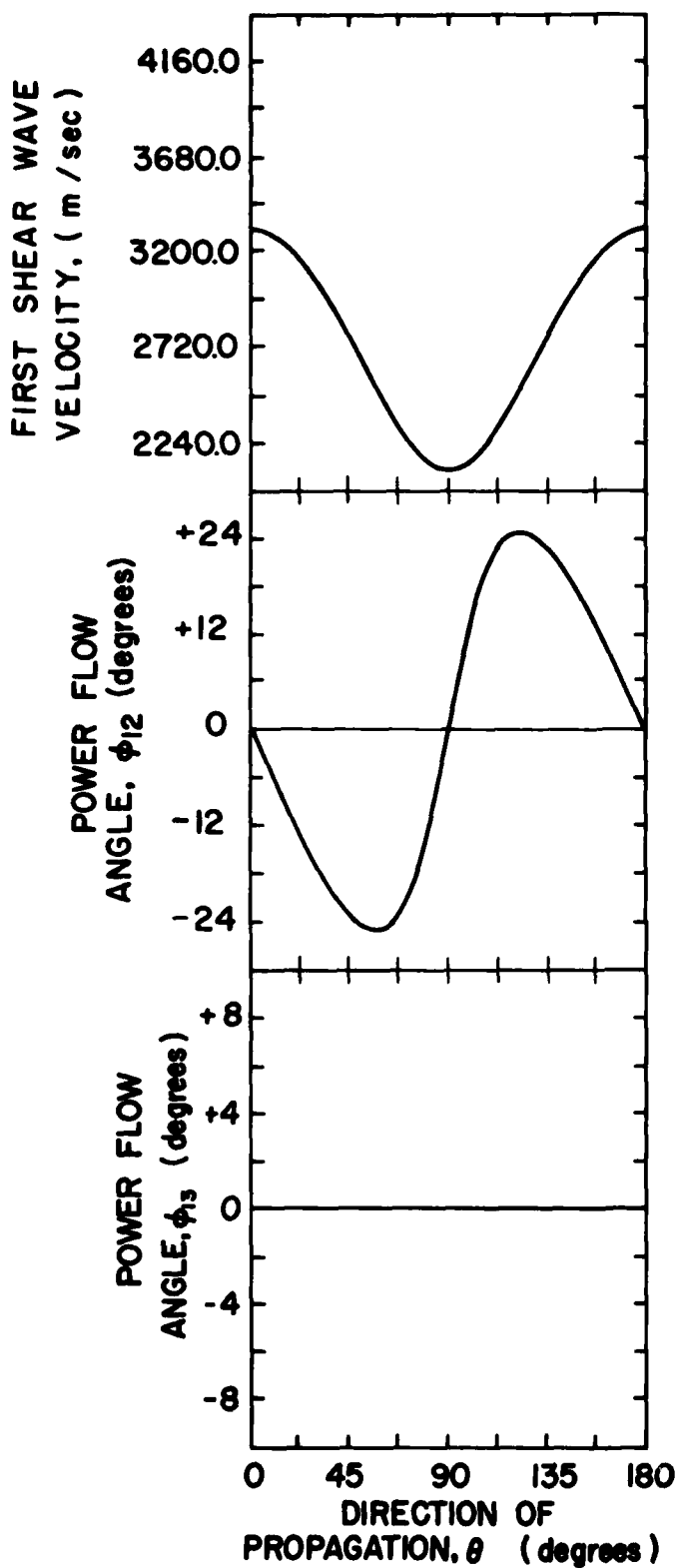


110-PLANE
SPINEL

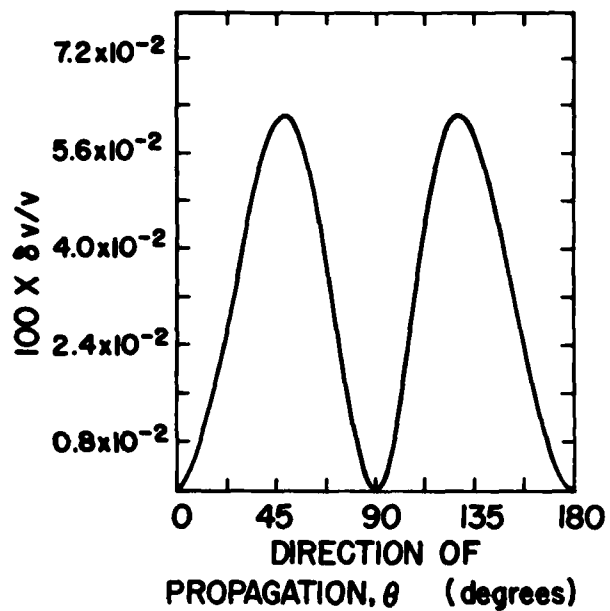


X-PLANE AND Y-PLANE TeO₂

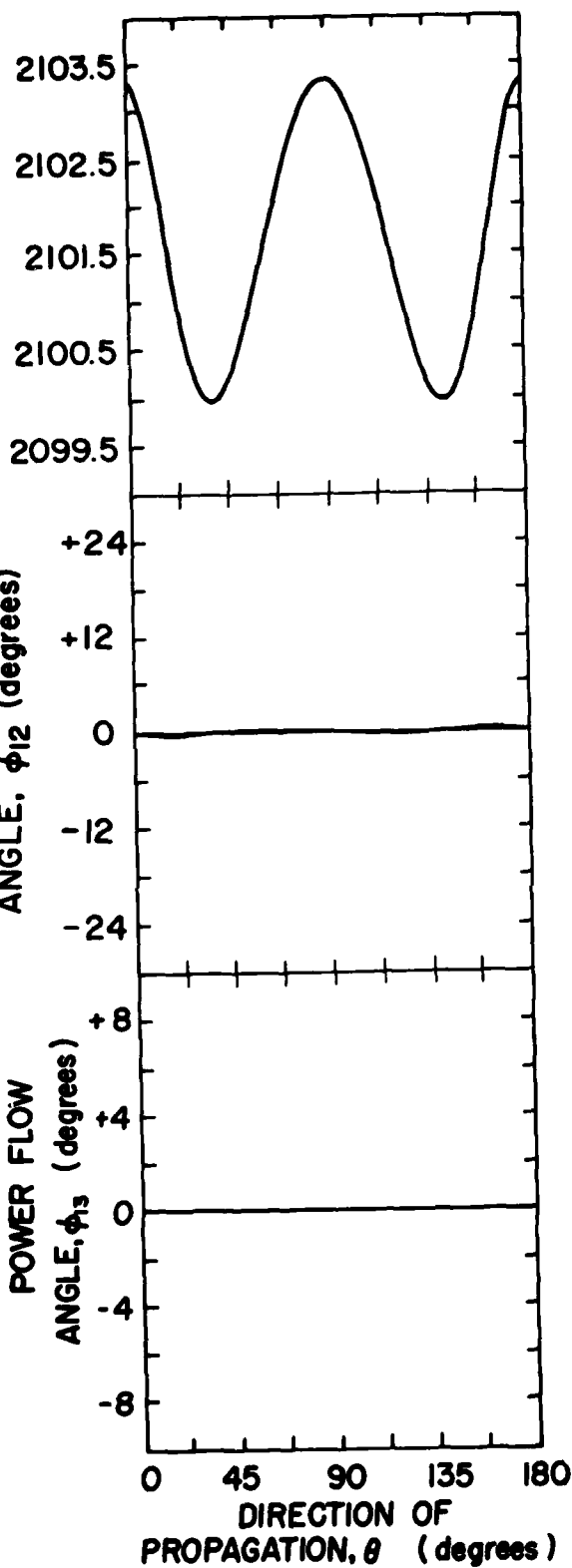




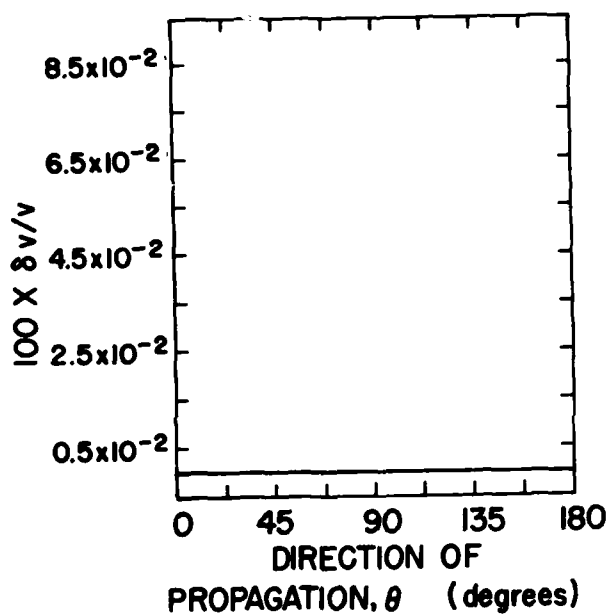
X-PLANE AND Y-PLANE TeO₂

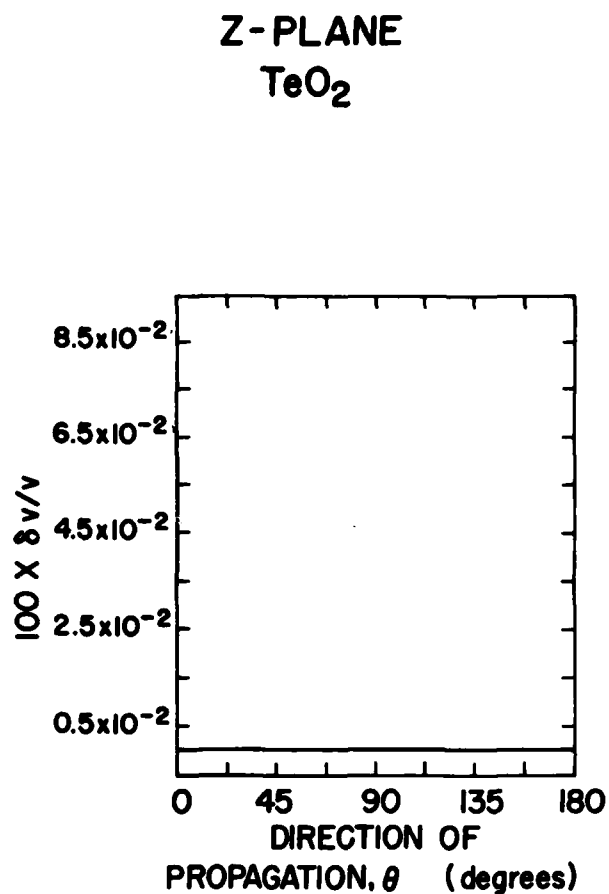
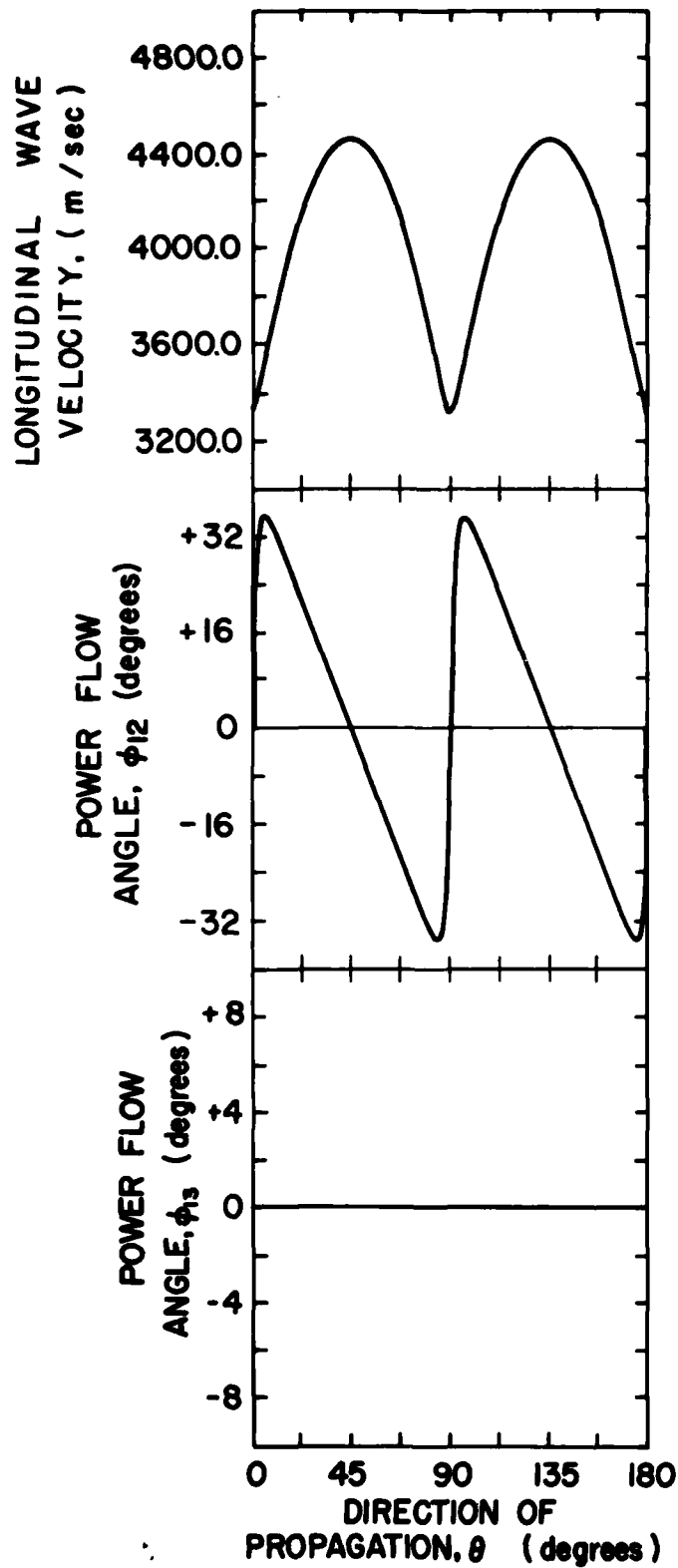


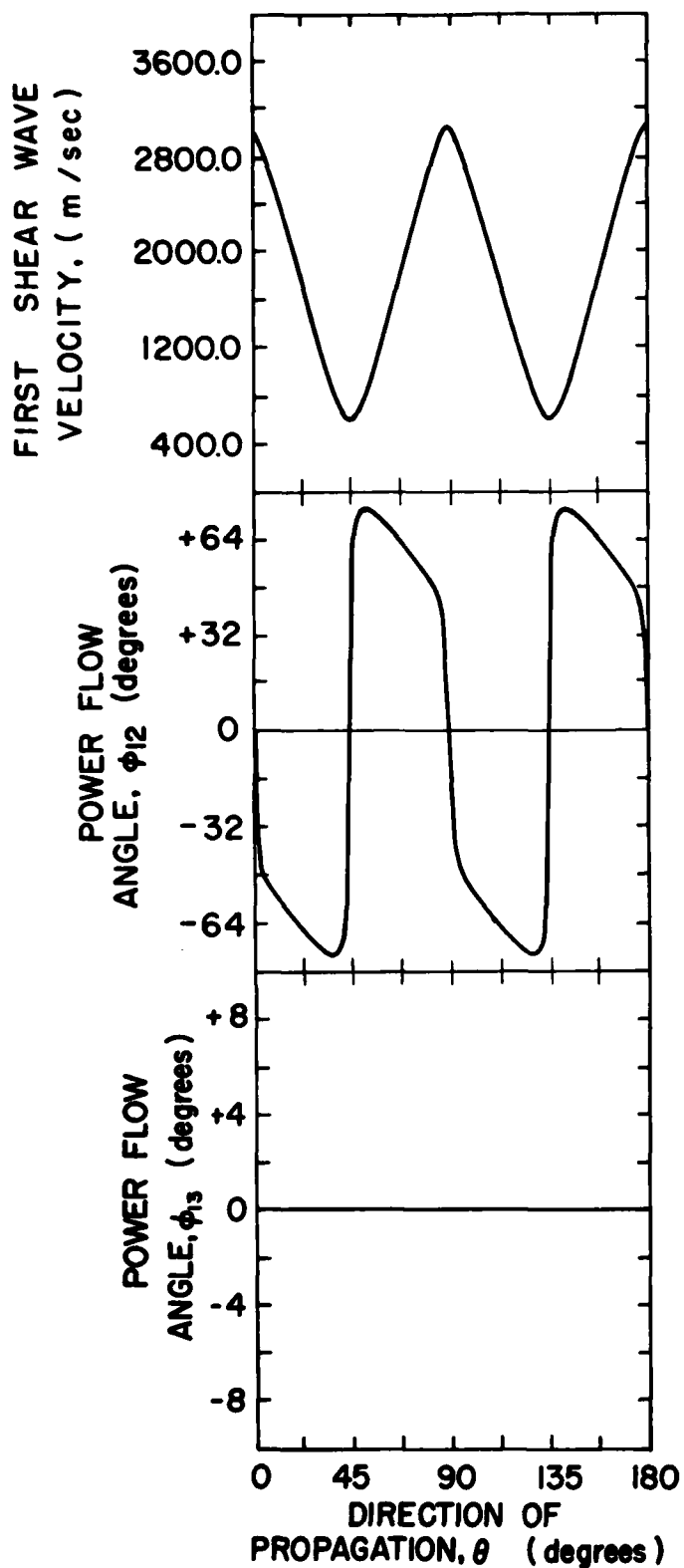
SECOND SHEAR WAVE
VELOCITY, (m/sec)



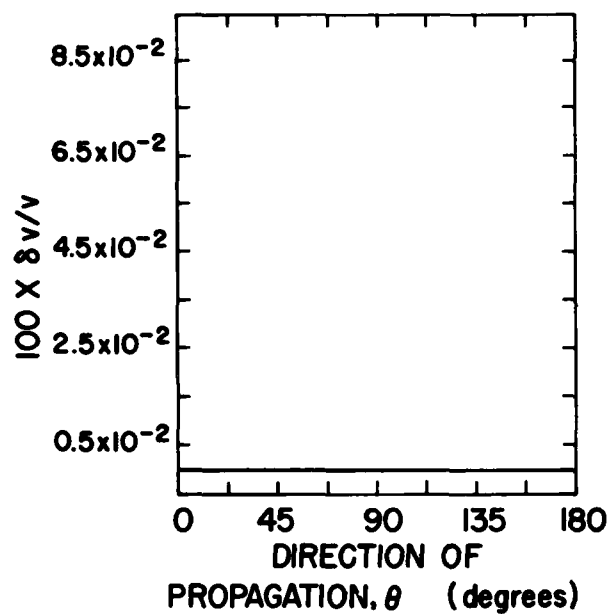
X-PLANE AND Y-PLANE
TeO₂



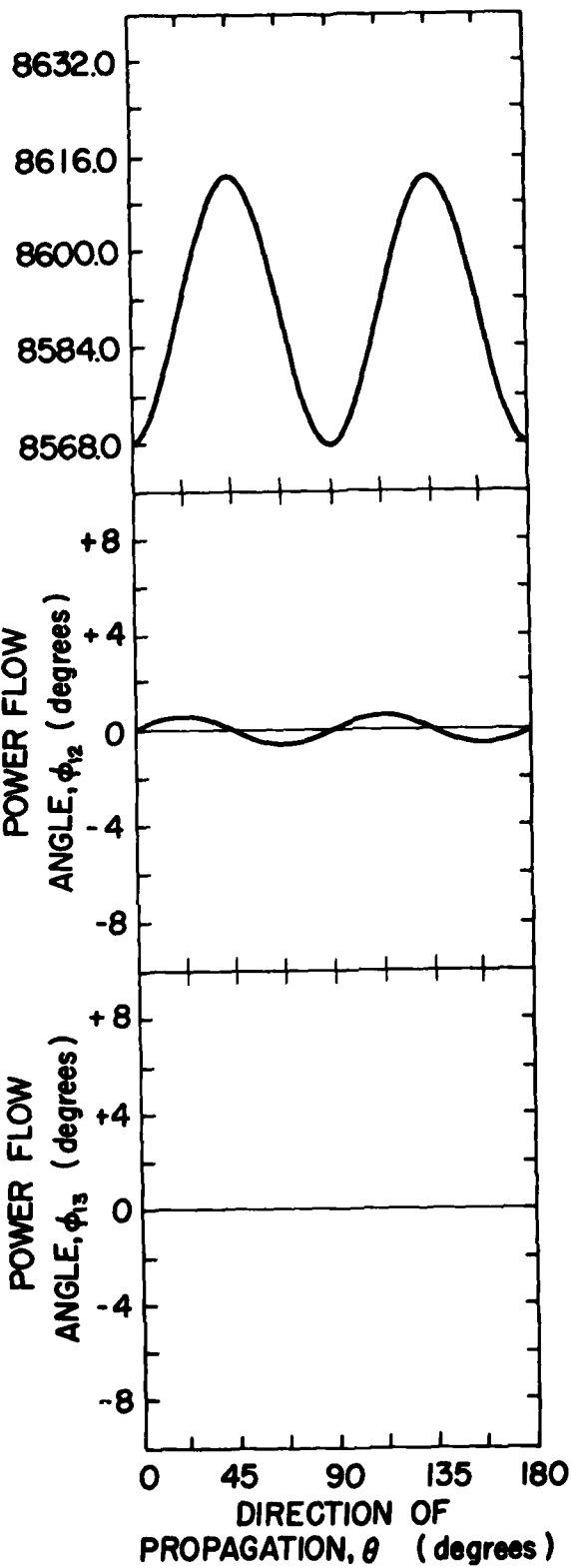




Z-PLANE
TeO₂

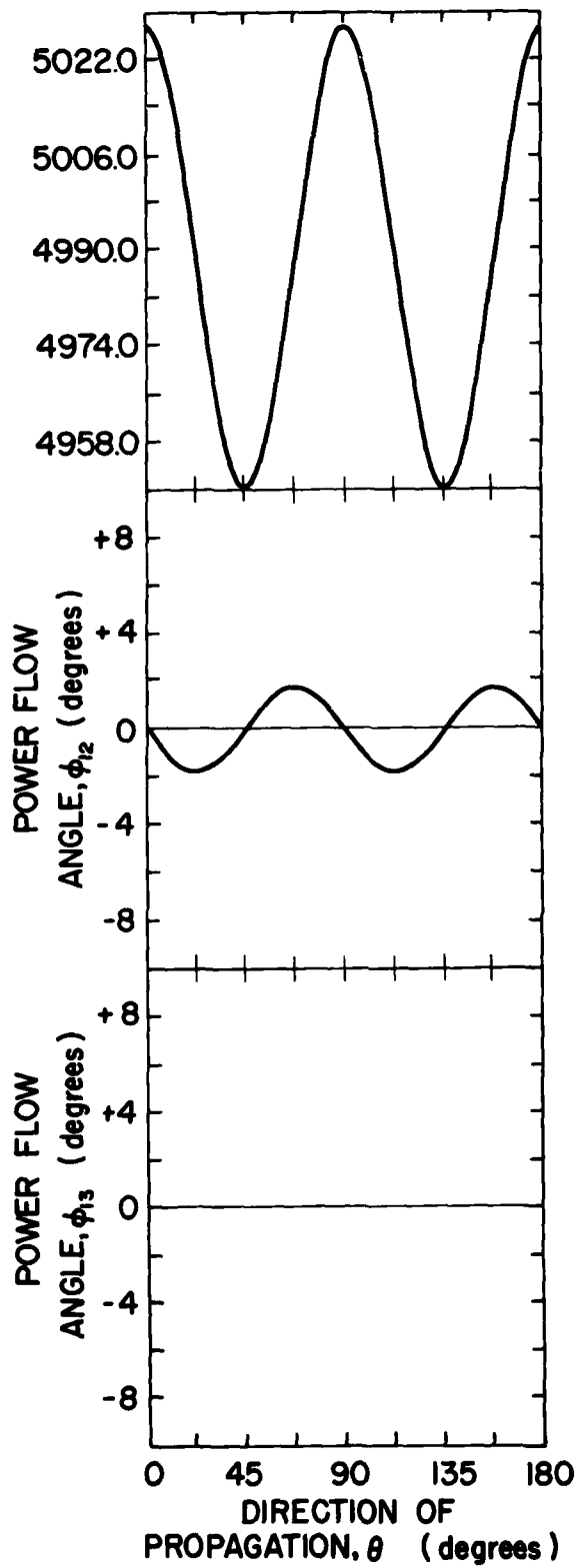


LONGITUDINAL WAVE
VELOCITY, (m / sec)

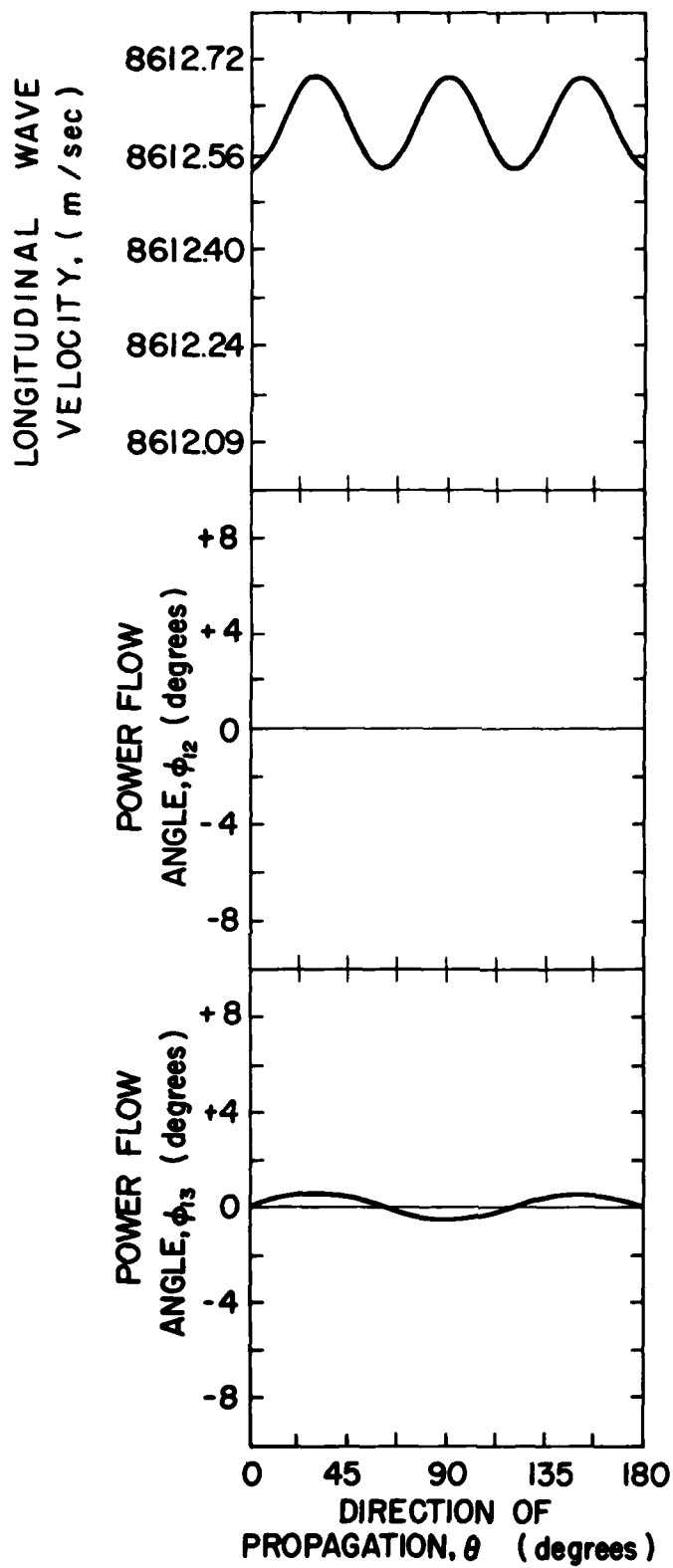


Z-PLANE
YAG

SECOND SHEAR WAVE
VELOCITY, (m / sec)

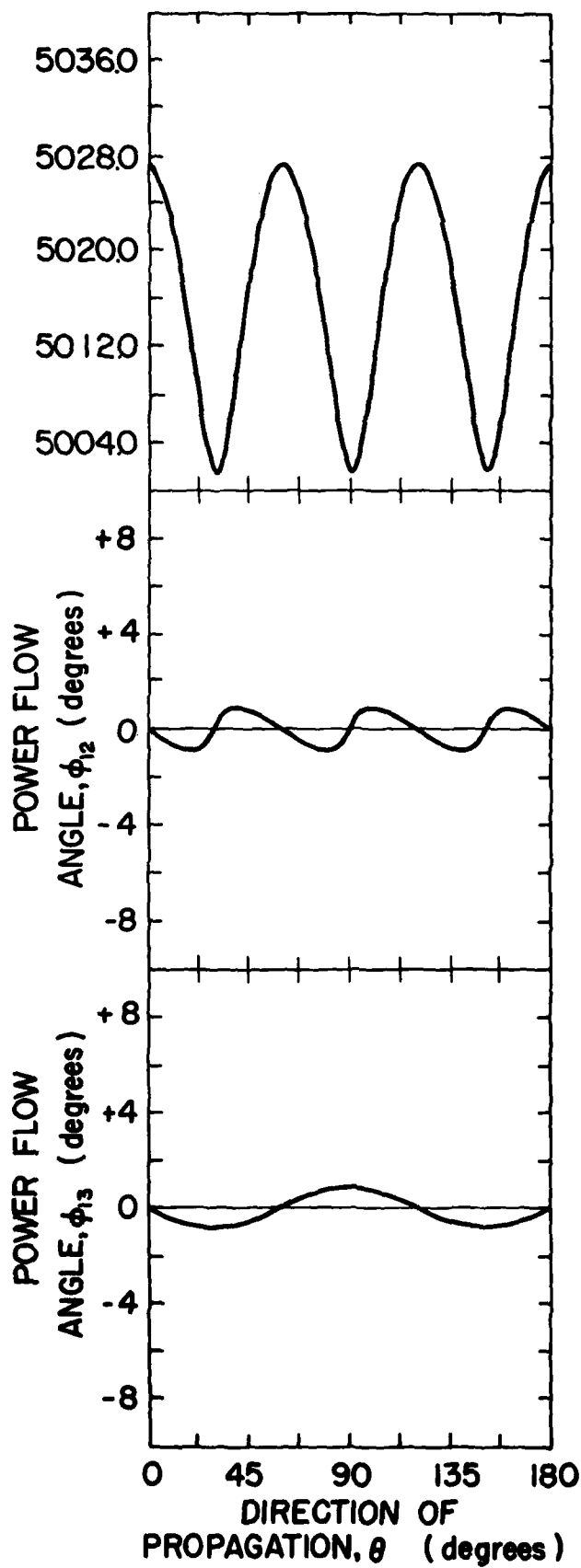


Z-PLANE
YAG



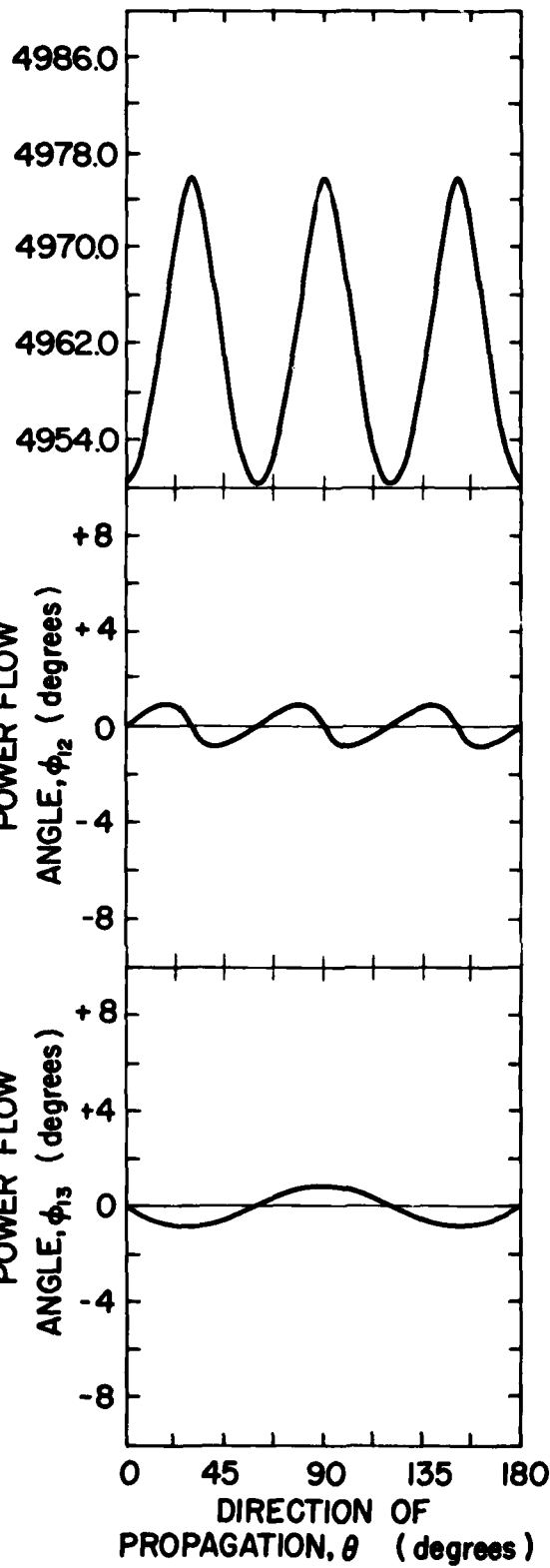
III-PLANE
YAG

FIRST SHEAR WAVE
VELOCITY, (m / sec)

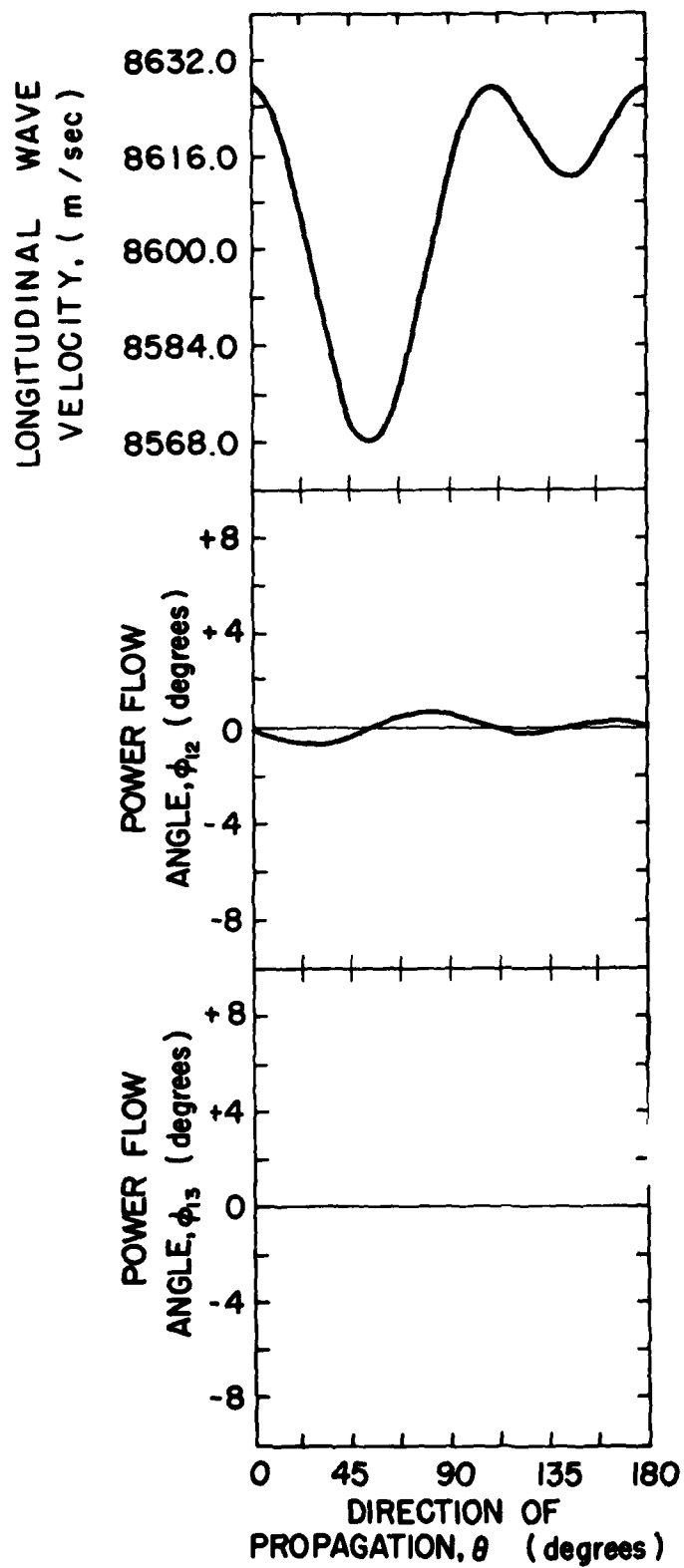


III-PLANE
YAG

SECOND SHEAR WAVE
VELOCITY, (m / sec)

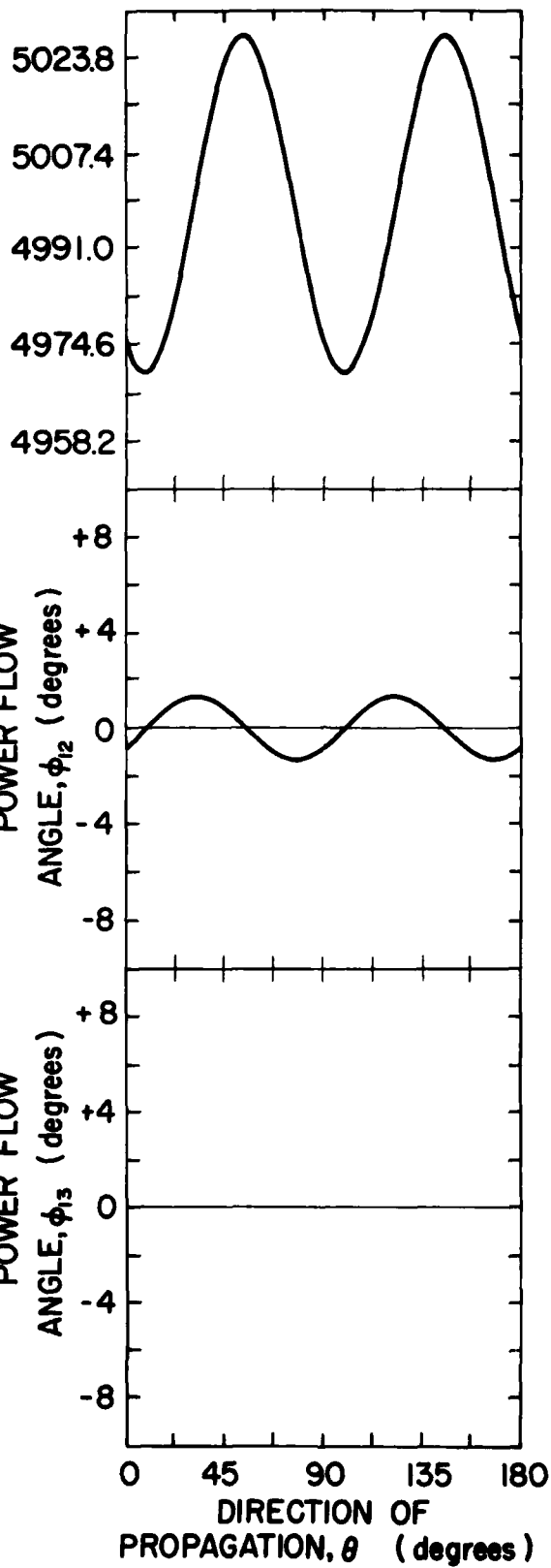


III-PLANE
YAG



110 - PLANE
YAG

FIRST SHEAR WAVE
VELOCITY, (m / sec)



110-PLANE
YAG

SECOND SHEAR WAVE
VELOCITY, (m / sec)

5023.8
50074
4991.0
4974.6
4958.2

110-PLANE
YAG

POWER FLOW

ANGLE, ϕ_{12} (degrees)

+8
+4
0
-4
-8

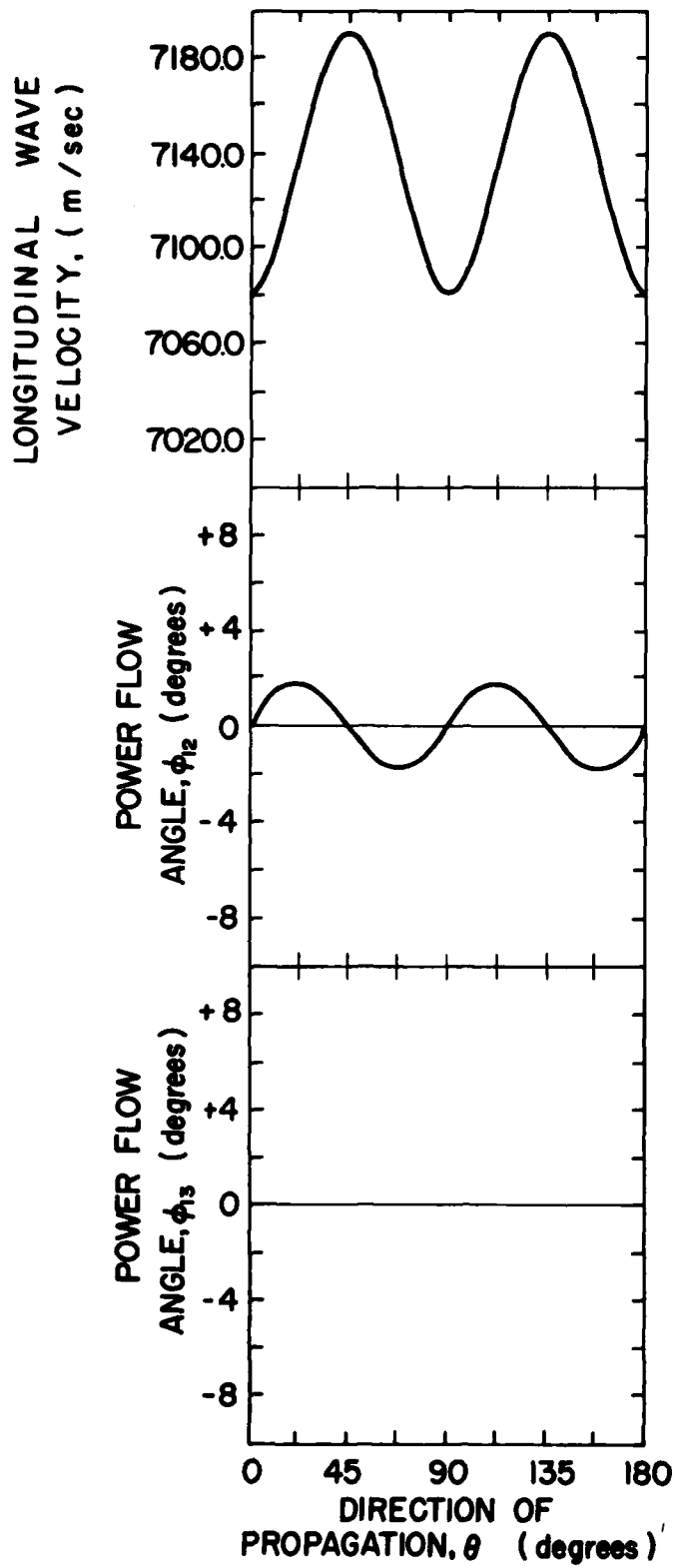
POWER FLOW

ANGLE, ϕ_{13} (degrees)

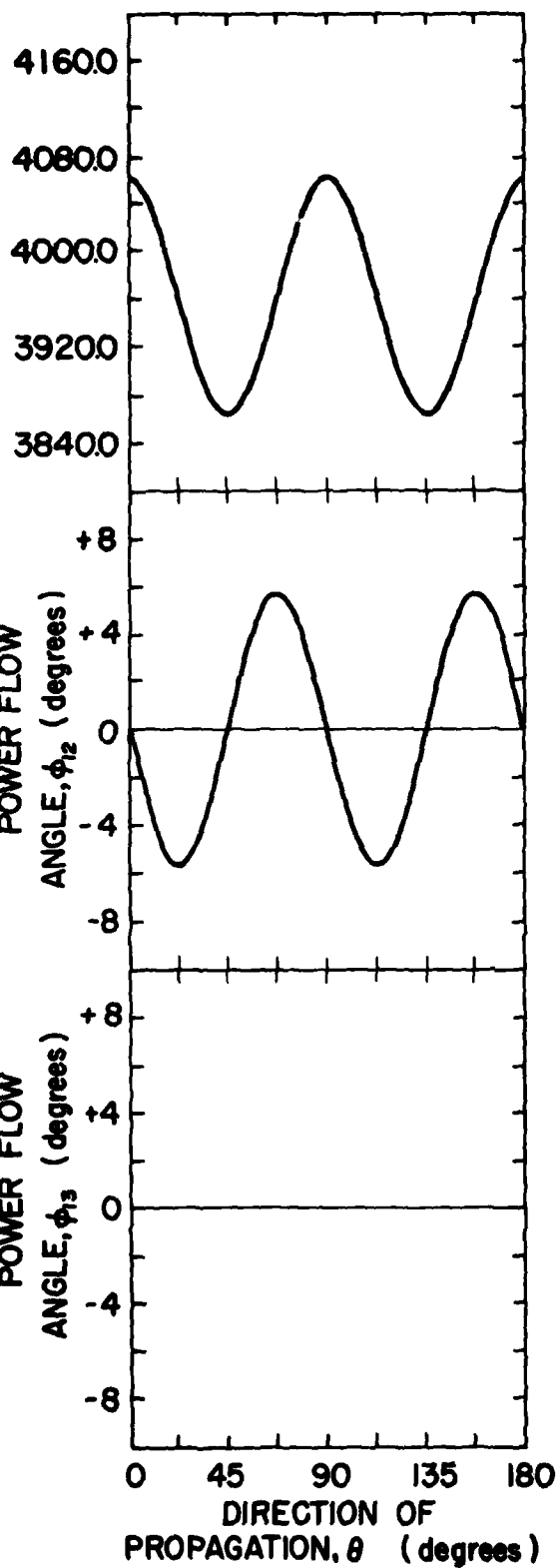
+8
+4
0
-4
-8

0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

Z-PLANE
YTTRIUM GALLIUM GARNET

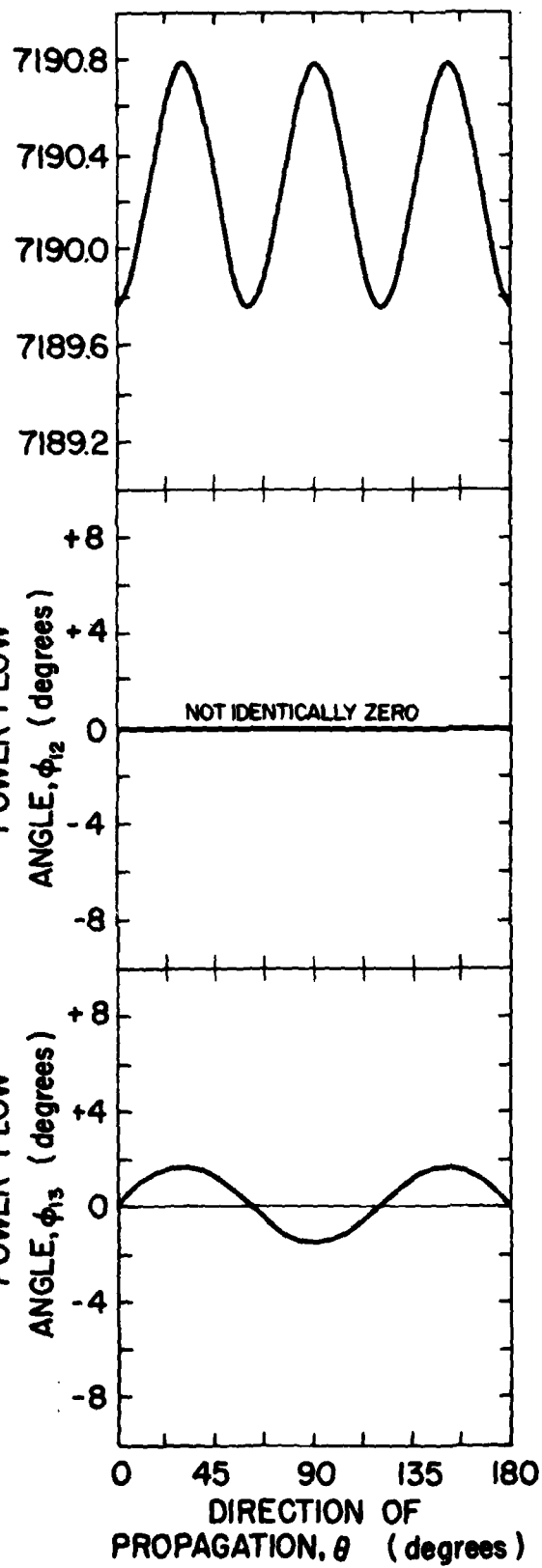


SECOND SHEAR WAVE
VELOCITY, (m / sec)



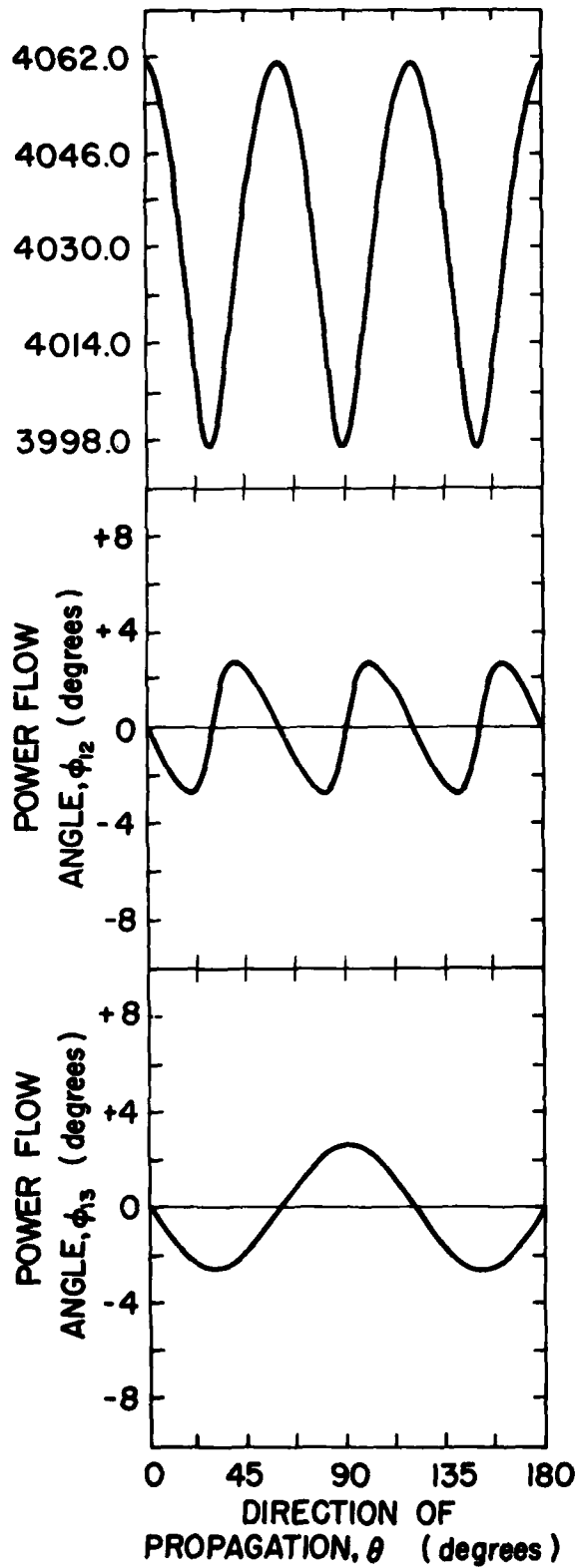
Z-PLANE
YTTRIUM GALLIUM GARNET

LONGITUDINAL WAVE
VELOCITY, (m / sec)



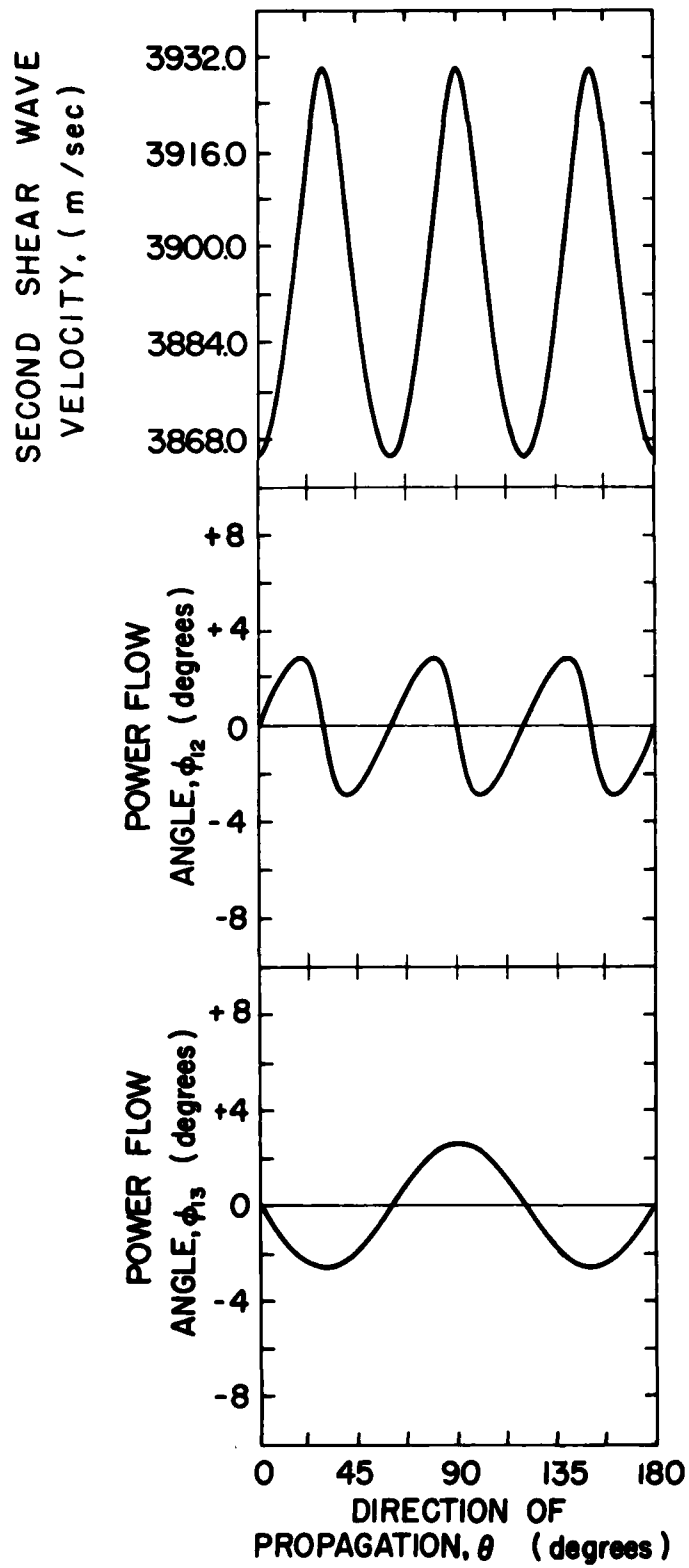
III-PLANE
YTTRIUM GALLIUM GARNET

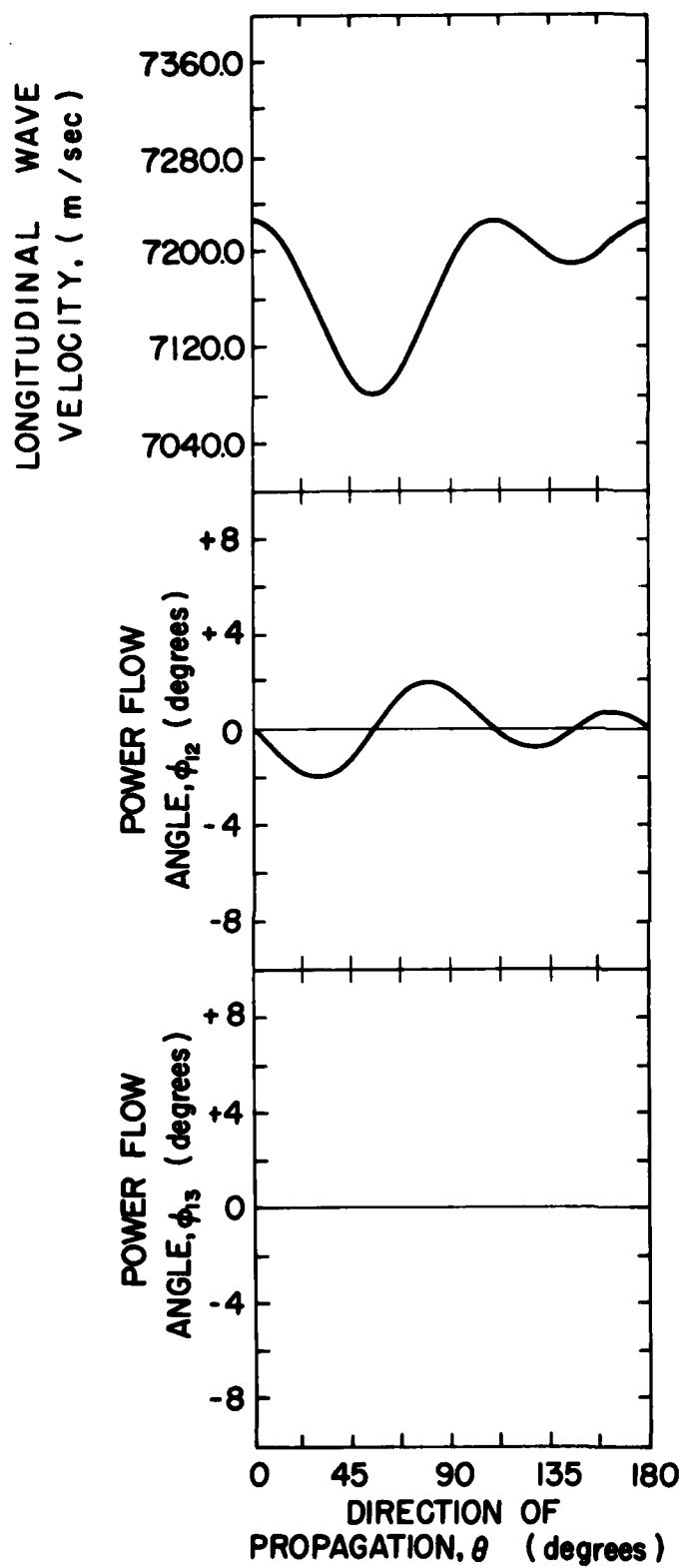
FIRST SHEAR WAVE
VELOCITY, (m/sec)



III - PLANE
YTTRIUM GALLIUM GARNET

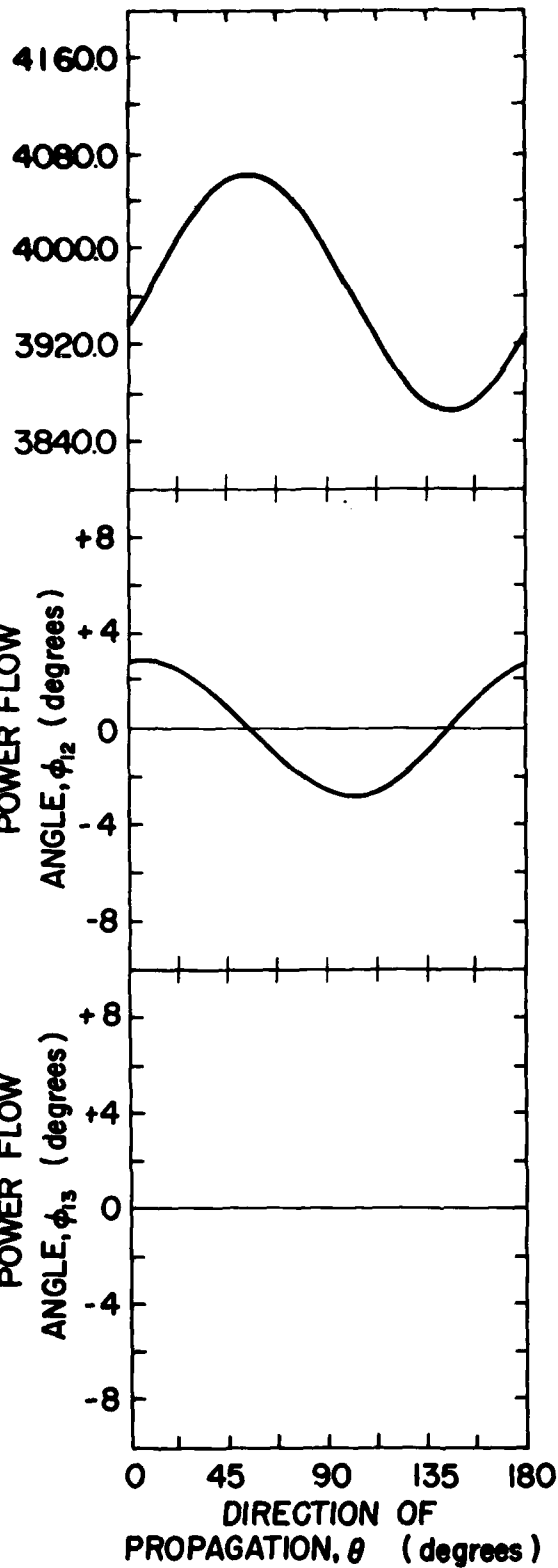
III-PLANE
YTTRIUM GALLIUM GARNET





110-PLANE
YTTRIUM GALLIUM GARNET

FIRST SHEAR WAVE
VELOCITY, (m / sec)



110-PLANE
YTTRIUM GALLIUM GARNET

POWER FLOW
ANGLE, ϕ_{12} (degrees)

POWER FLOW
ANGLE, ϕ_{13} (degrees)

DIRECTION OF
PROPAGATION, θ (degrees)

SECOND SHEAR WAVE
VELOCITY, (m / sec)

4160.0
4080.0
4000.0
3920.0
3840.0

110 - PLANE
YTTRIUM GALLIUM GARNET

POWER FLOW

ANGLE, ϕ_{12} (degrees)

+8

+4

0

-4

-8

POWER FLOW

ANGLE, ϕ_{13} (degrees)

+8

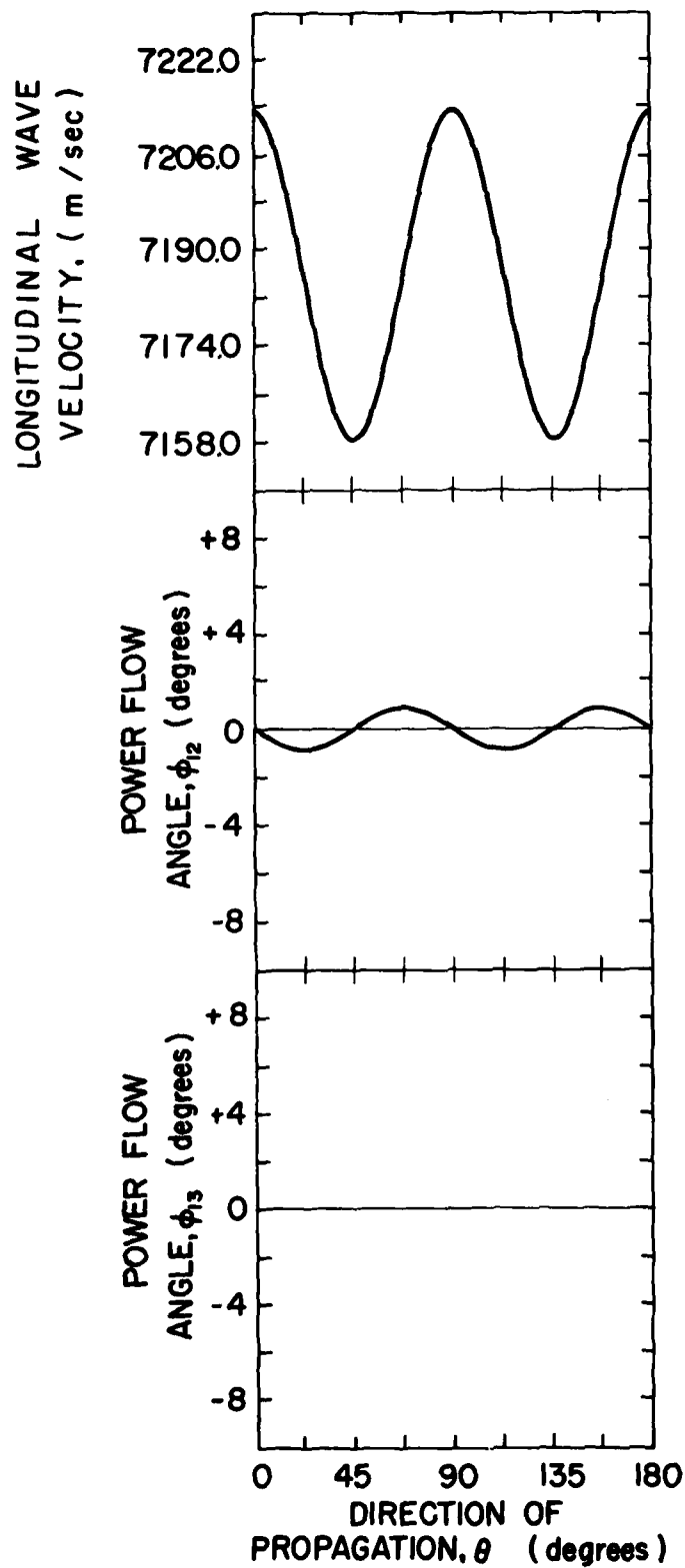
+4

0

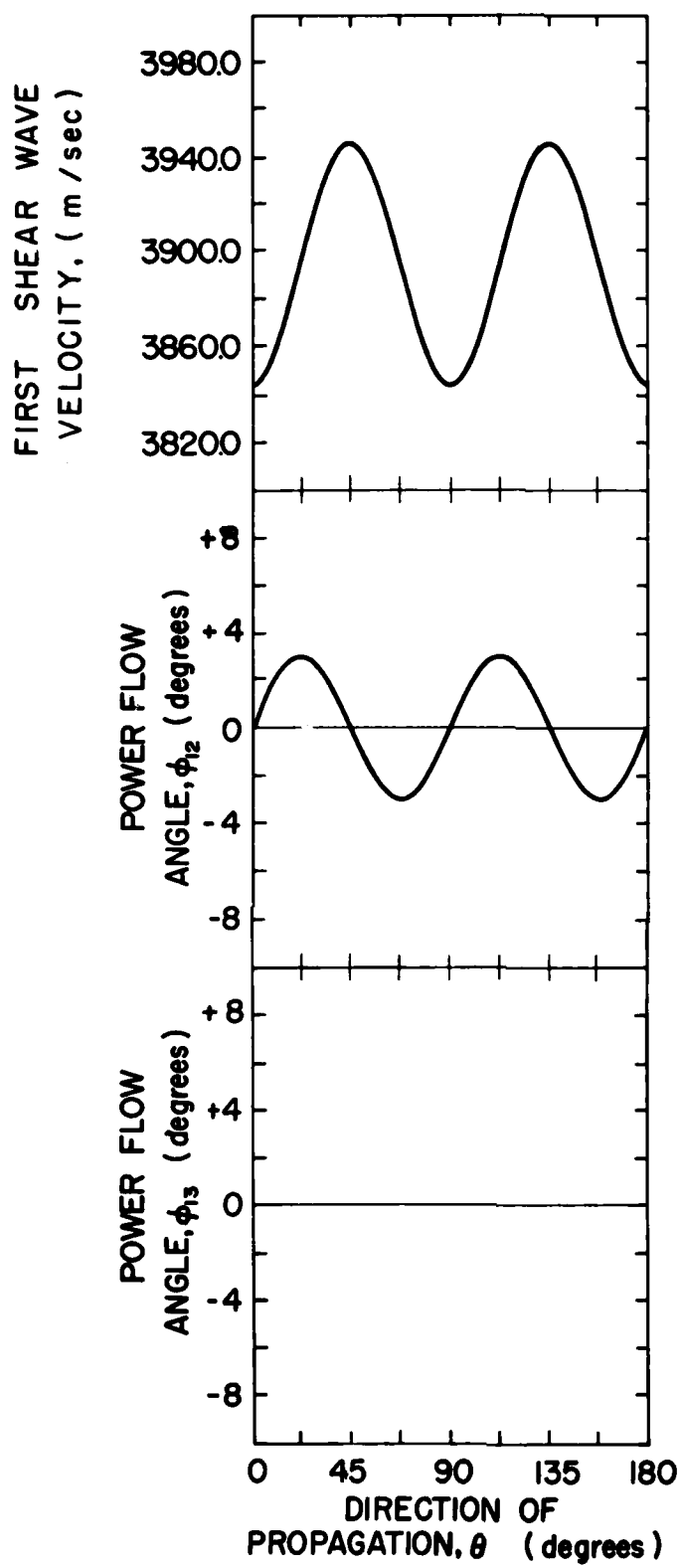
-4

-8

0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)



Z-PLANE
YIG



Z-PLANE
YIG

LONGITUDINAL WAVE
VELOCITY, (m / sec)

7158.36
7158.28
7158.20
7158.12
7158.04

POWER FLOW
ANGLE, ϕ_{12} (degrees)

+8
+4
0
-4
-8

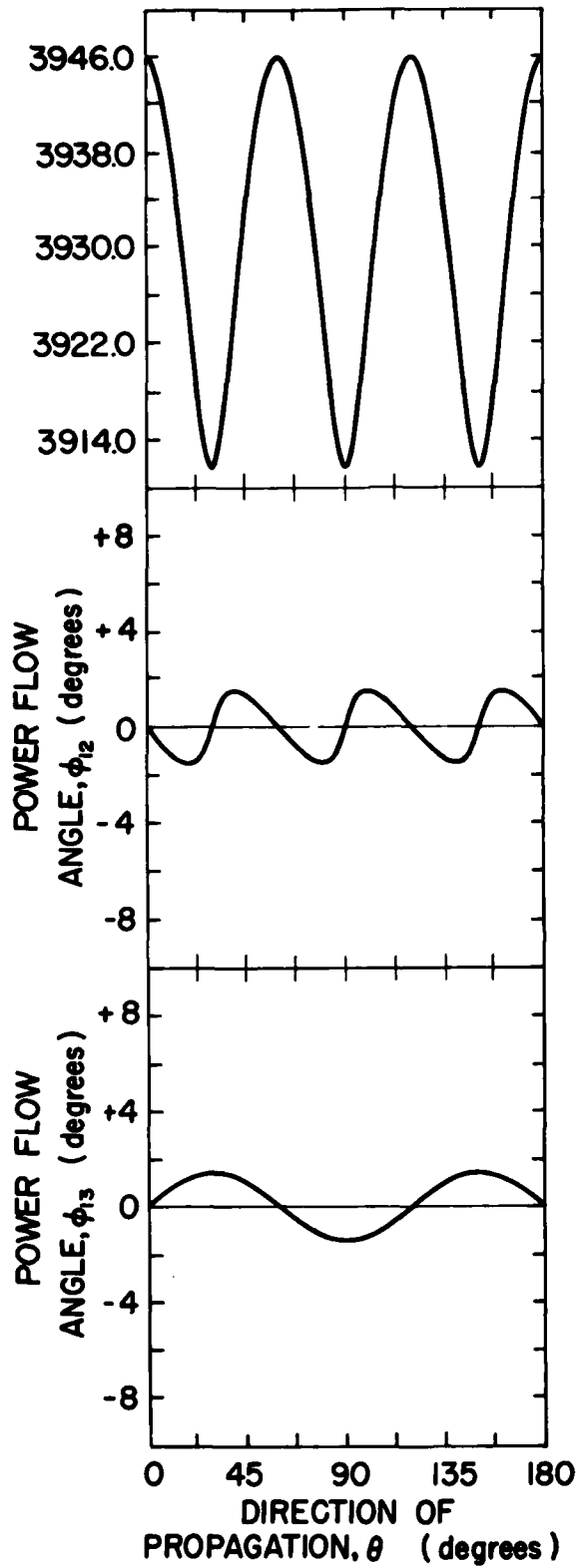
POWER FLOW
ANGLE, ϕ_{13} (degrees)

+8
+4
0
-4
-8

0 45 90 135 180
DIRECTION OF
PROPAGATION, θ (degrees)

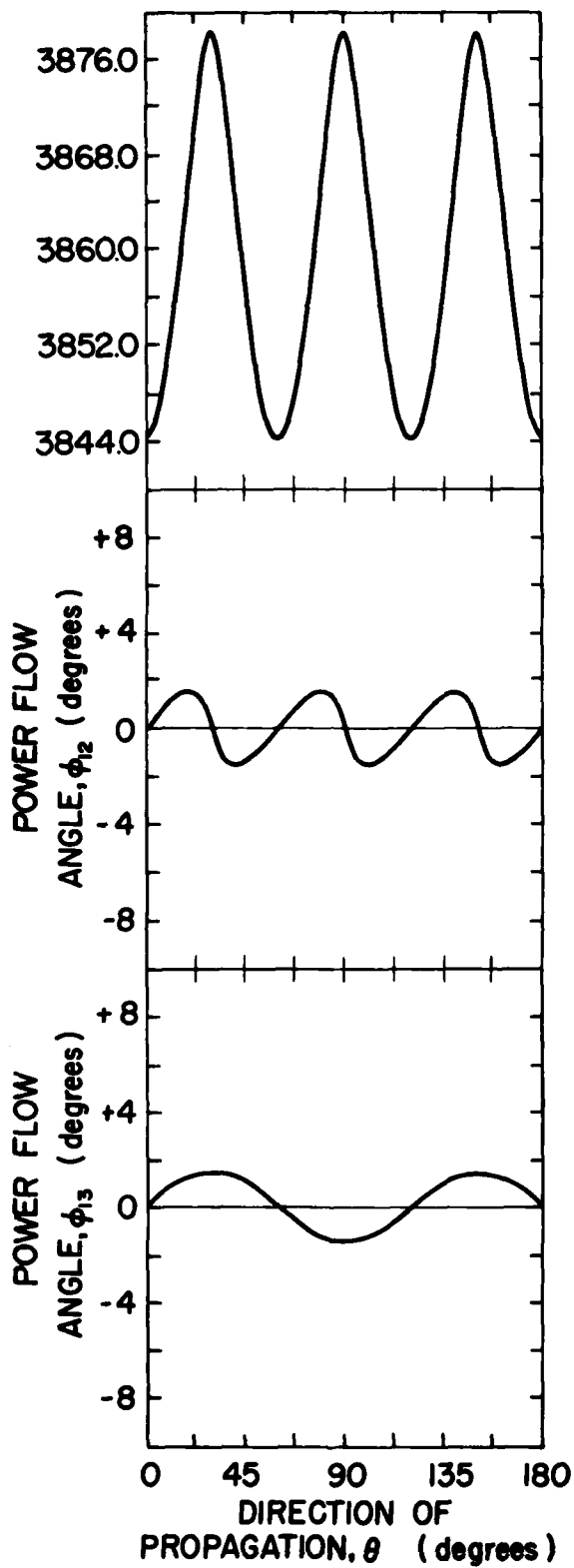
III-PLANE
YIG

FIRST SHEAR WAVE
VELOCITY, (m / sec)

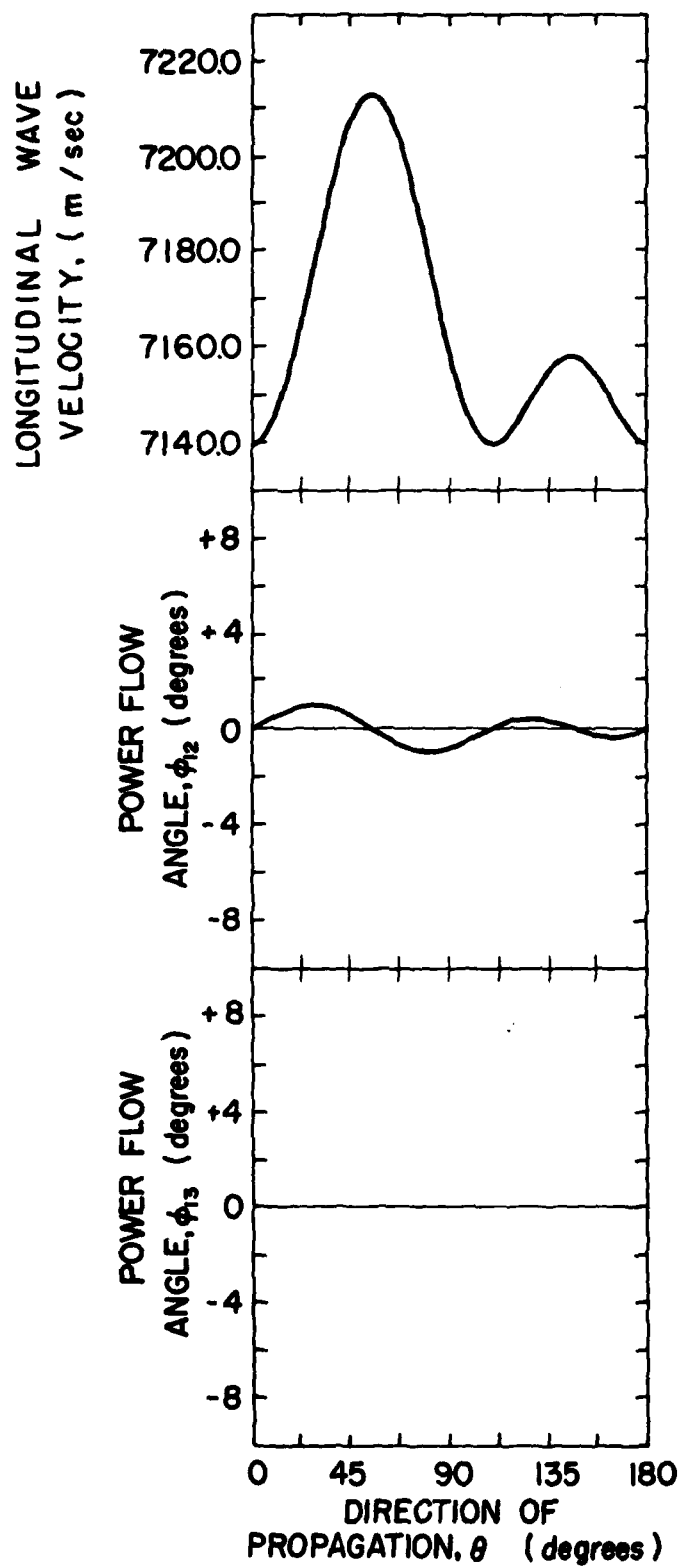


III-PLANE
YIG

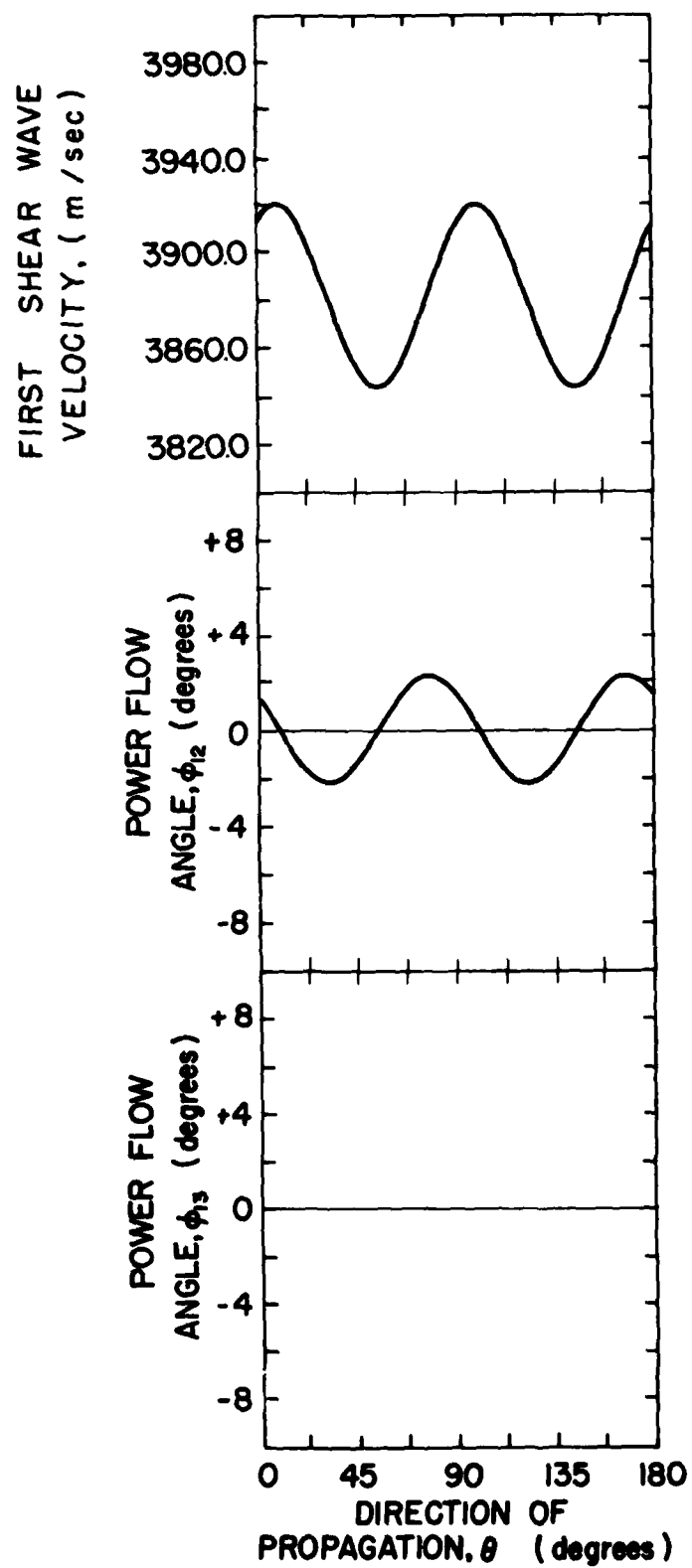
SECOND SHEAR WAVE
VELOCITY, (m / sec)



III-PLANE
YIG

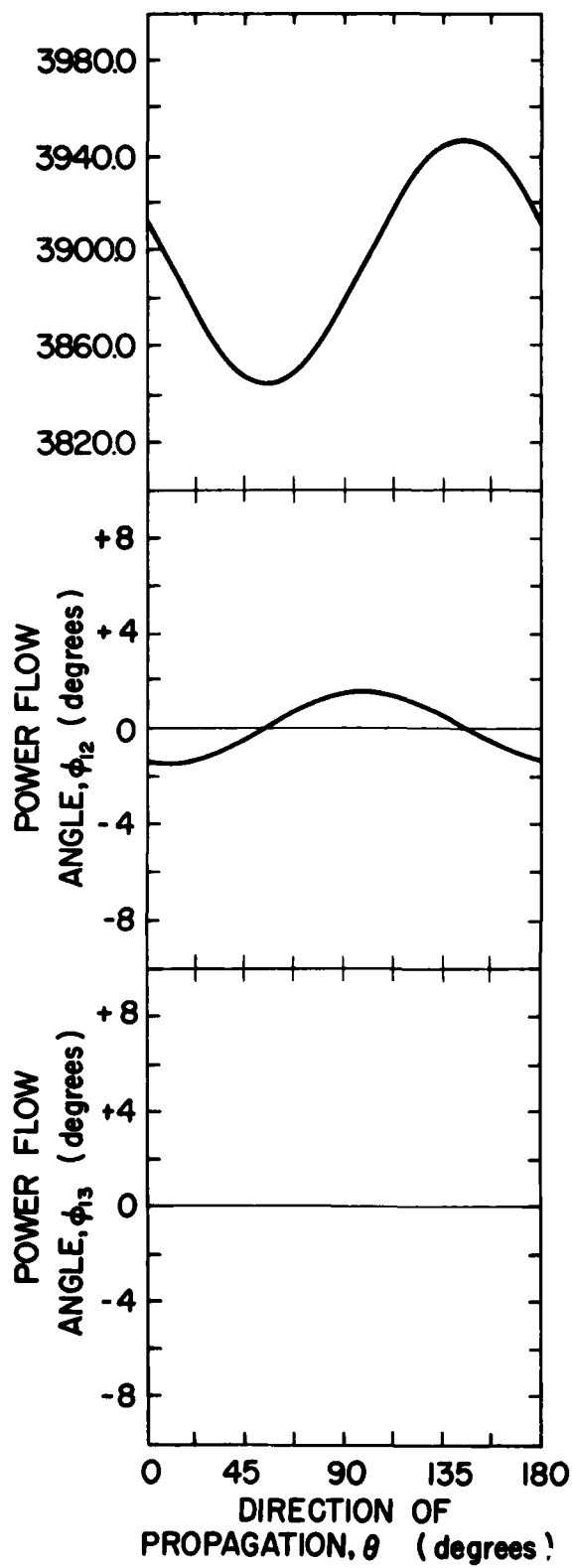


110-PLANE
YIG

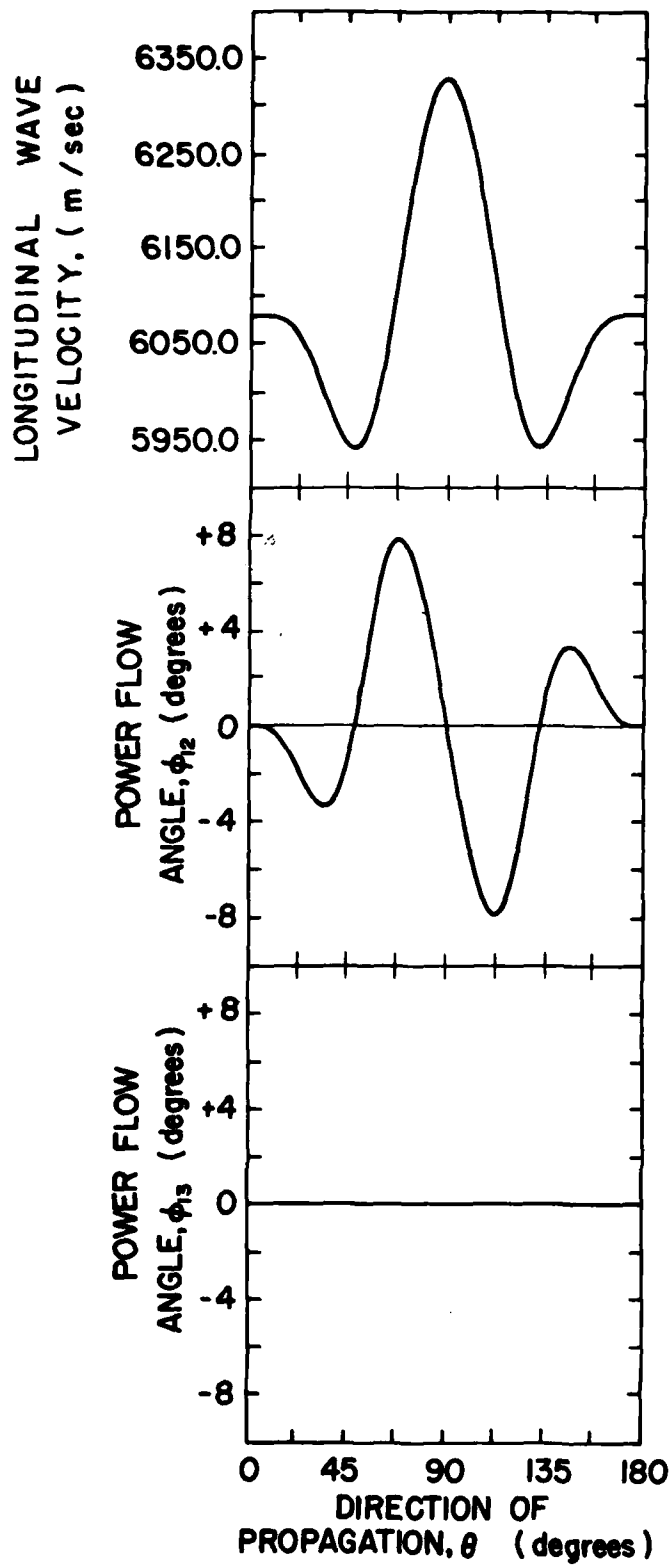


110-PLANE
YIG

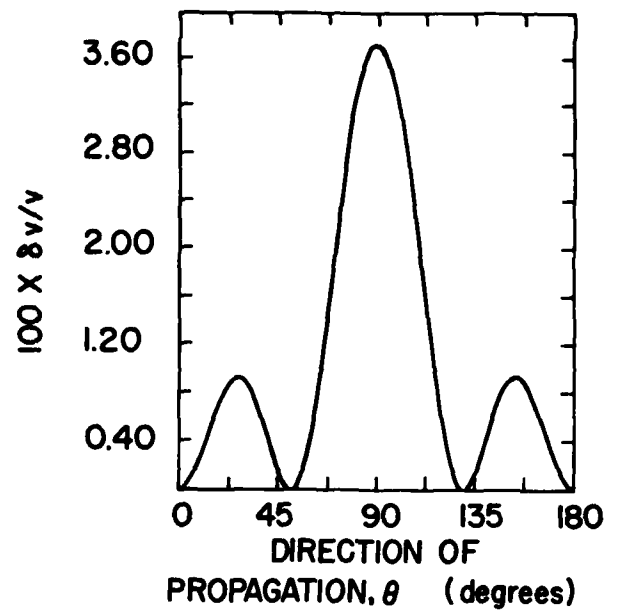
SECOND SHEAR WAVE
VELOCITY, (m / sec)

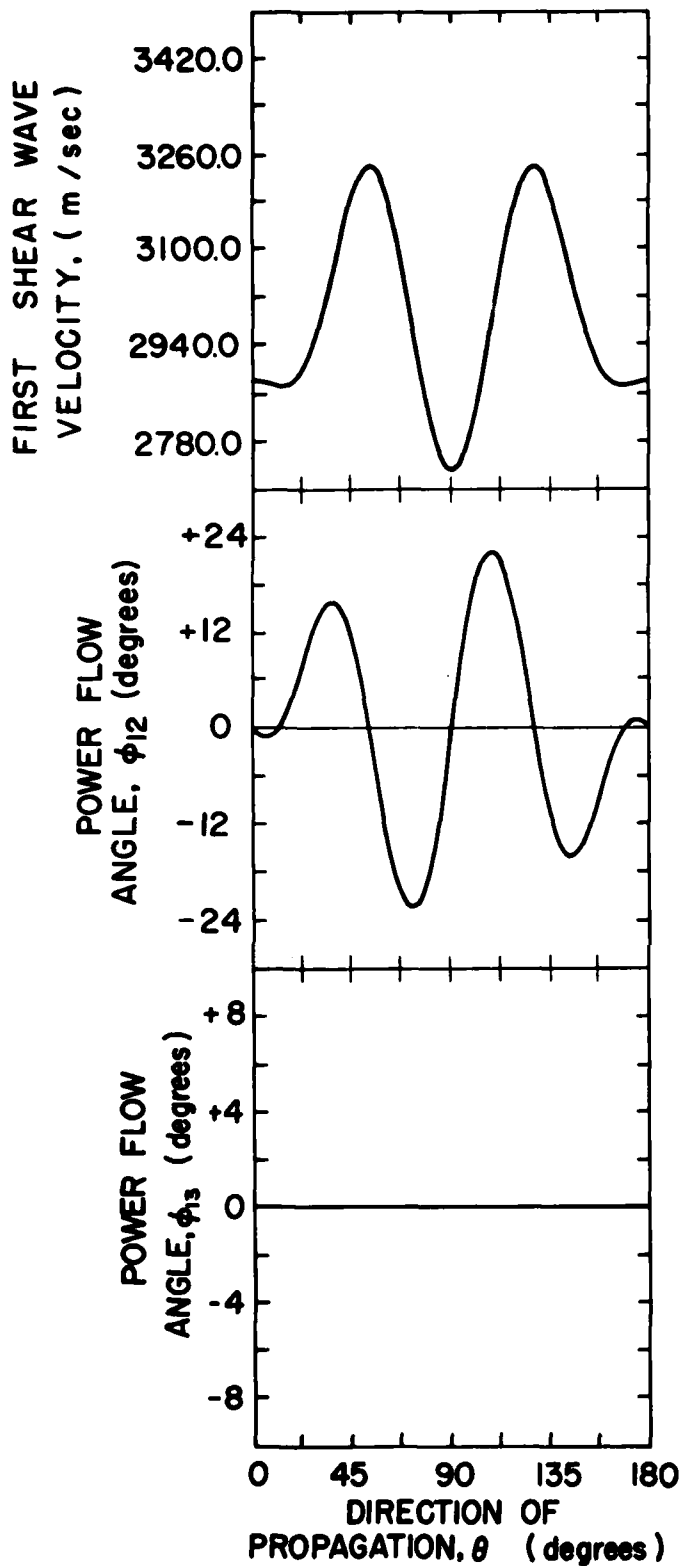


IIO-PLANE
YIG

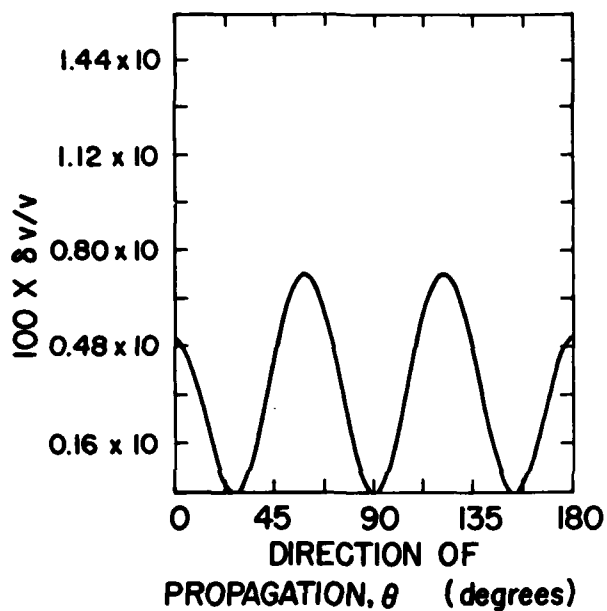


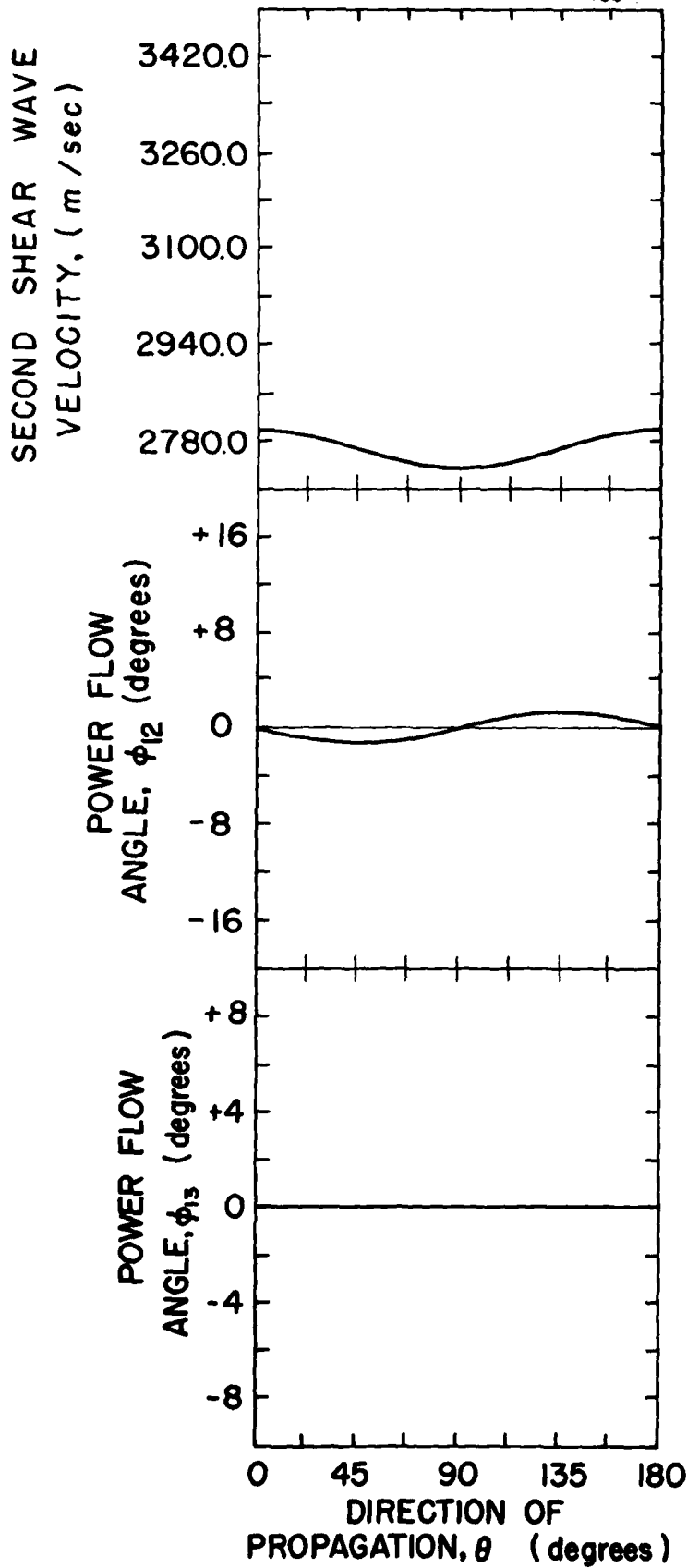
X-PLANE AND Y-PLANE ZnO (Jaffe and Berlincourt, Bateman)



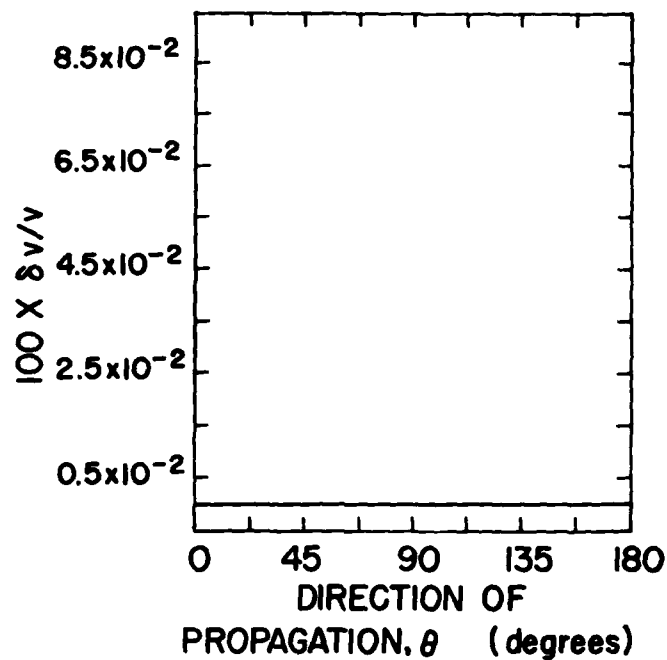


**X-PLANE AND Y-PLANE
ZnO
(Jaffe and Berlincourt, Bateman)**





X-PLANE AND Y-PLANE ZnO (Jaffe and Berlincourt, Bateman)



4. NUMERICAL DATA

Detailed numerical data have been calculated for various crystalline orientations of interest, for example, those having zero power flow angles (pure mode axes). λ , μ , and θ are the Euler angles defining the exact crystalline orientation under study (see Figure 1) and all other parameters have previously been defined in Sections 2 and 3. The quantities printed out are, of course, those divided by the angular frequency ω (in the case of S_{ij} , T_{ij} , E_i and D_i) or ω^2 (in the case of P_i) as indicated in Section 2. For the method of normalization of the β 's prior to the calculation of the parameters given in this section the reader is referred to Slobodnik and O'Brien.³ Finally, the quantities T_{ij} , S_{kj} , u_i , ϕ , E_i , and D_i are all divided by the square root of the magnitude of P_1 with their phases ultimately determined by the signs of the β 's. This yields the so-called normalized components which are printed out in this section.

For materials and orientations having degenerate shear waves (identical characteristics except for polarization) only a single shear wave data sheet is included.

SINGLE CRYSTAL ALUMINUM

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .6353769E+04
 = .1573869E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .8577597E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .5857504E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T21 = .3385530E+04 -90.000
 T22 = 0. 90.000
 T23 = .3385530E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .5373857E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S21 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .3414424E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

SINGLE CRYSTAL ALUMINUM

LAMBDA = 0.0060
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3220306E+04
 = .3105295E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .4347413E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .4170090E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .7446593E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .4796059E-03 0.000

ISOTROPIC ALUMINUM

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .6420453E+04
 = .1557522E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P41 12 = 0.000
 P41 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .8667612E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .5888162E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T21 = .3126599E+04 -90.000
 T22 = 0. 90.000
 T23 = .3126599E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .5290352E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .3396646E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ISOTROPIC ALUMINUM

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3109126E+04
 = .3216339E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P41 12 = 0.000
 P41 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .4197321E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .4097473E+04 -90.000
 T21 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .7849565E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .4881059E-03 0.000

POLYCRYSTALLINE ALUMINUM

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .6411795E+04
 = .1559626E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12

= 0.000

PHI 13

= 0.000

COMPLEX POWER
 FLOW (RE IM)

P1

= .8655923E+07 0.

P2

= 0. 0.

P3

= 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11

= .5884190E+04 -90.000

T12

= 0. 90.000

T13

= 0. 90.000

T22

= .3105893E+04 -90.000

T23

= 0. 90.000

T33

= .3105893E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11

= .5301072E-07 -90.000

S12

= 0. 90.000

S13

= 0. 90.000

S22

= 0. 90.000

S23

= 0. 90.000

S33

= 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1

= .3398939E-03 0.000

U2

= 0. 0.000

U3

= 0. 0.000

POLYCRYSTALLINE ALUMINUM

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3115077E+04
 = .3210194E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = 0.000
 P4I 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .4205354E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .4101392E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .7827084E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .4876393E-03 0.000

BARIUM SODIUM NIOBATE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .6826695E+04
 = .1464838E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = -.000
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1809074E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .8506643E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .1790872E+04 -90.000
 T23 = 0. 90.000
 T33 = .3581744E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3443985E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2351104E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PH = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = .1033195E-07 90.000
 D3 = 0. 90.000

BARIUM SODIUM NIOBATE

LAMBOA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3786769E+04
 = .2640773E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = .000
 PHI 13 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1003494E+09 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6335594E+04 -90.000
 T21 = 0. 90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T31 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .4168154E-07 -90.000
 S21 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S31 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3156768E-03 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = .1772110E-36 90.000
 D3 = 0. 90.000

BARIUM SODIUM NIOBATE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3653668E+04
 = .2736975E-03

DELTA V/V

= .4151E+01

POWER FLOW
 ANGLES

PHI 12 = .000
 PHI 13 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1 = 3383836E-11 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .6223253E+04 -90.000
 T13 = 0. 90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .4397982E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .3213753E-03 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PH = .5436199E+06 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = .1487874E+03 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = .1405225E-13 -90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

BARIUM SODIUM NIOBATE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY	=	.5158836E+04	
INVERSE OF VELOCITY	=	.1623683E-03	
DELTA V/V	=	.1805E+02	
POWER FLOW	PHI 12	=	.000
ANGLES	PHI 13	=	.000
COMPLEX POWER	P1	=	.6920281E-13 0.
FLOW (RE IM)	P2	=	0. 0.
	P3	=	0. 0.
NORMALIZED	T11	=	.8079831E+04 -90.000
STRESS	T12	=	0. 90.000
COMPONENTS	T13	=	0. 90.000
(MAG, PHASE)	T22	=	.1904767E+04 -90.000
	T23	=	0. 90.000
	T33	=	.1762663E+04 -90.000
NORMALIZED	S11	=	.4019102E-07 -90.000
STRAIN	S12	=	0. 90.000
COMPONENTS	S13	=	0. 90.000
(MAG, PHASE)	S22	=	0. 90.000
	S23	=	0. 90.000
	S33	=	0. 90.000
NORMALIZED	U1	=	.2475299E-03 0.000
MECHANICAL	U2	=	0. 0.000
DISPLACEMENT	U3	=	0. 0.000
(MAG, PHASE)			
ELECTRIC POTENTIAL	PHI	=	.3801353E+07 0.000
(MAG, PHASE)			
NORMALIZED ELECTRIC	E1	=	.6172193E+03 90.000
FIELD (MAG, PHASE)	E2	=	0. 90.000
	E3	=	0. 90.000
NORMALIZED ELECTRIC	D1	=	.1535354E-20 -90.000
DISPLACEMENT	D2	=	0. 90.000
(MAG, PHASE)	D3	=	0. 90.000

BARIUM SODIUM NIOBATE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3528857E+04
 = .2833773E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PH 12 = -.000
 PH 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .9351470E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6116035E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .4633360E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3270093E-03 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = .2594681E-06 -90.000

PARIUM SODIUM NIOBATE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3502021E+04
 = .2855494E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= .000
 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .9280356E+07 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = .6092735E+04 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = .4686719E-07 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = .3282593E-03 180.000
 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PH

= 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1
 E2
 E3

= 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1
 D2
 D3

= 0. 90.000
 = .3186963E-05 90.000
 = 0. 90.000

BARIUM SODIUM NIOBATE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .6715232E+04
 = .1489152E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1779536E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .8436910E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .3671292E+04 -90.000
 T23 = 0. 90.000
 T33 = .1765044E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3530088E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2370536E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = .1412035E-07 90.000

BARIUM SODIUM NIOBATE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3786769E+04
 = .2640773E-03

DELTA ν/ν

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .1003494E+08 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = .6335534E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = .4162154E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = .3156753E-03 0.000
 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PH

= 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1
 E2
 E3

= 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1
 D2
 D3

= 0. 90.000
 = 0. 90.000
 = 0. 90.000

BARIUM SODIUM NIOBATE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3634219E+04
 = .2751623E-03

DELTA V/V

= .2899E+01

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .4719033E-11 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6206667E+04 -90.000
 T21 = 0. 90.000
 T23 = 0. 90.000
 T31 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .4433334E-07 -90.000
 S21 = 0. 90.000
 S23 = 0. 90.000
 S31 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3222341E-03 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = .4603345E+06 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = .1266667E+03 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = .1487421E-20 90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

BISMUTH GERMANIUM OXIDE (SLOBODNIK AND SETHARES)

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY	=	.3730019E+04	
INVERSE OF VELOCITY	=	.2680951E-03	
DELTA V/V	=	0.	
POWER FLOW	PHI 12	=	0.000
ANGLES	PHI 13	=	0.000
COMPLEX POWER	P1	=	.1715809E+08 0.
FLOW (RE IM)	P2	=	0. 0.
	P3	=	0. 0.
NORMALIZED	T11	=	.8284465E+04 -90.000
STRESS	T12	=	0. 90.000
COMPONENTS	T13	=	0. 90.000
(MAG, PHASE)	T22	=	.1974033E+04 -90.000
	T23	=	0. 90.000
	T33	=	.1974033E+04 -90.000
NORMALIZED	S11	=	.6472238E-07 -90.000
STRAIN	S12	=	0. 90.000
COMPONENTS	S13	=	0. 90.000
(MAG, PHASE)	S22	=	0. 90.000
	S23	=	0. 90.000
	S33	=	0. 90.000
NORMALIZED	U1	=	.2414157E-03 0.000
MECHANICAL	U2	=	0. 0.000
DISPLACEMENT	U3	=	0. 0.000
(MAG, PHASE)			
ELECTRIC POTENTIAL	PHI	=	0. 0.000
(MAG, PHASE)			
NORMALIZED ELECTRIC	E1	=	0. 90.000
FIELD (MAG, PHASE)	E2	=	0. 90.000
	E3	=	0. 90.000
NORMALIZED ELECTRIC	D1	=	0. 90.000
DISPLACEMENT	D2	=	0. 90.000
(MAG, PHASE)	D3	=	0. 90.000

BISMUTH GERMANIUM OXIDE (SLOBODNIK AND SEIHARES)

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY	=	.1664854E+04	
INVERSE OF VELOCITY	=	.6006532E-03	
DELTA V/V	=	0.	
POWER FLOW	PHI 12	=	0.000
ANGLES	PHI 13	=	0.000
COMPLEX POWER	P1	=	.7658329E+07 0.
FLOW (RE IM)	P2	=	0. 0.
	P3	=	0. 0.
NORMALIZED	T11	=	0. 90.000
STRESS	T12	=	0. 90.000
COMPONENTS	T13	=	.5534737E+04 -90.000
(MAG, PHASE)	T22	=	0. 90.000
	T23	=	0. 90.000
	T32	=	0. 90.000
NORMALIZED	S11	=	0. 90.000
STRAIN	S12	=	0. 90.000
COMPONENTS	S13	=	.1085243E-06 -90.000
(MAG, PHASE)	S22	=	0. 90.000
	S23	=	0. 90.000
	S32	=	0. 90.000
NORMALIZED	U1	=	0. 0.000
MECHANICAL	U2	=	0. 0.000
DISPLACEMENT	U3	=	.3613541E-03 0.000
(MAG, PHASE)			
ELECTRIC POTENTIAL	PH	=	0. 0.000
(MAG, PHASE)			
NORMALIZED ELECTRIC	E1	=	0. 90.000
FIELD (MAG, PHASE)	E2	=	0. 90.000
	E3	=	0. 90.000
NORMALIZED ELECTRIC	D1	=	0. 90.000
DISPLACEMENT	D2	=	.2148780E-06 -90.000
(MAG, PHASE)	D3	=	0. 90.000

BISMUTH GERMANIUM OXIDE (SLOBODNIK AND SETHARES)

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .3374295E+04
 = .2963582E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1552176E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .7879533E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .4043197E+04 -30.000
 T23 = 0. 90.000
 T33 = .2294279E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .7522227E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2538222E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = .7447005E-07 -90.000

BISMUTH GERMANIUM OXIDE (SLOBODNIK AND SETHARES)

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2301937E+04
 = .4344168E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12

= 0.000

PHI 13

= 0.000

COMPLEX POWER
 FLOW (RE IM)

P1

= .1058891E+08

0.

P2

= 0.

0.

P3

= 0.

0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11

= 0.

90.000

T12

= .6508121E+04

-90.000

T13

= 0.

90.000

T22

= 0.

90.000

T23

= 0.

90.000

T33

= 0.

90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11

= 0.

90.000

S12

= .6674996E-07

-90.000

S13

= 0.

90.000

S22

= 0.

90.000

S23

= 0.

90.000

S33

= 0.

90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1

= 0.

0.000

U2

= .3073084E-03

0.000

U3

= 0.

0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI

= 0.

0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1

= 0.

90.000

E2

= 0.

90.000

E3

= 0.

90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1

= 0.

90.000

D2

= 0.

90.000

D3

= .1000893E-34

-90.000

BISMUTH GERMANIUM OXIDE (SLOBODNIK AND SEMHARES)

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1755915E+04
 = .5695036E-03

DELTA V/V

= .5186E+01

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .9639249E-12 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .5684085E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .1001926E-06 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3518595E-03 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = .1018541E+07 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = .5800626E+03 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = .2327147E-20 90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

BISMUTH GERMANIUM OXIDE (SLOBOODNIK AND BETHARES)

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .3310409E+04
 = .3020774E-03

DELTA V/V

= .1913E+01

POWER FLOW
 ANGLES

PHI 12 = -.000
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1362959E-11 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .7804584E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .3412962E+04 -90.000
 T23 = 0. 90.000
 T33 = .3412993E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .7741026E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2562597E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = .8565618E+06 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = .2587480E+03 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = .1321213E-11 -90.000
 D3 = 0. 90.000

BISMUTH GERMANIUM OXIDE (SLOBODNIK AND SEMHARES)

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2111051E+04
 = .4736976E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = -14.966
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .9710836E+07 0.
 P2 = -.2595887E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6232443E+04 90.000
 T22 = 0. 90.000
 T23 = .1666048E+04 -90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .7600513E-07 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3209015E-03 190.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = .8688463E-07 -90.000

BISMUTH GERMANIUM OXIDE (SLOBODNIK AND SETHARES)

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2111044E+04
 = .4736993E-03

DELTA ν/ν

= .1316E-08

POWER FLOW
 ANGLES

PHI 12 = 14.967
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .9710801E+07 0.
 P2 = .2596024E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .6232432E+04 -90.000
 T13 = 0. 90.000
 T22 = .1666115E+04 -90.000
 T23 = 0. 90.000
 T33 = .1666031E+04 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .7500554E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .3209020E-03 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PH = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = .8598684E-07 90.000
 D3 = 0. 90.000

CADMIUM SULPHIDE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .4337906E+04
 = .2305260E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12
 PHI 13

= .000
 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .1045435E+08 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= .6466638E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = .3636147E+04 -90.000
 = 0. 90.000
 = .4142356E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= .7129701E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= .3092797E-03 0.000
 = 0. 0.000
 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI

= 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1
 E2
 E3

= 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1
 D2
 D3

= 0. 90.000
 = .1739647E-07 90.000
 = 0. 90.000

CADMIUM SULPHIDE

LAMBDA = 90.9000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1938952E+04
 = .5437881E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = .000
 PHI 13 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .4431873E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .4210407E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .1291535E-06 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .4750139E-03 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

CADMIUM SULPHIDE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1796298E+04
 = .5567005E-03

DELTA V/V

= .1793F+01

POWER FLOW
 ANGLES

PH 12 = 0.000
 PH 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .6251189E-12 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .4161294E+04 90.000
 T13 = 0. 90.000
 T21 = 0. 90.000
 T23 = 0. 90.000
 T31 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .1337808E-05 90.000
 S13 = 0. 90.000
 S21 = 0. 90.000
 S23 = 0. 90.000
 S31 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .4806205E-03 180.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

P4I = .1264791E+07 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = .7041096E+03 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = .4342182E-20 -90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

CADMIUM SULPHIDE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .4465092E+04
 = .2239596E-03

DELTA V/V

= .1202E+01

POWER FLOW
 ANGLES

PHI 12 = .000
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .3950001E-12 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .6560753E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .3394950E+04 -90.000
 T23 = 0. 90.000
 T33 = .3394950E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .6827251E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .3048430E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = .1591114E+07 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = .3563453E+03 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = .3052565E-20 -90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

CADMIUM SULPHIDE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1764096E+04
 = .5668627E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = -.000
 PHI 13 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .4251470E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .4123819E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .1374605E-06 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .4849874E-03 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = .5773346E-07 90.000

CADMIUM SULPHIDE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .4337906E+04
 = .2305260E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = 0.000
 P4I 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1045435E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .6466638E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .4142356E+04 -90.000
 T23 = 0. 90.000
 T33 = .3636147E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .7129701E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .3092797E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = .1739647E-07 90.000

CADMIUM SULPHIDE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1838952E+04
 = .5437881E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW, (RE IM)

P1 = .4431873E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .4210403E+04 -90.000
 T13 = 0. 90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .1291535E-06 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .4750139E-03 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PH = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

CADMIUM SULPHIDE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1796298E+04
 = .5567005E-03

DELTA V/V

= .1793E+01

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .6251189E-12 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .4161288E+04 90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .1337808E-05 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .4806205E-03 180.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = .1264791E+07 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = .7041096E+03 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = .4342182E-20 -90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

SINGLE CRYSTAL CHROMIUM

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY = .6920067E+04
 INVERSE OF VELOCITY = .1445073E-03

DELTA V/V = 0.

POWER FLOW P41 12 = 0.000
 ANGLES P41 13 = 0.000

COMPLEX POWER P1 = .2456624E+08 0.
 FLOW (RE IM) P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED T11 = .9912868E+04 -90.000
 STRESS T12 = 0. 90.000
 COMPONENTS T13 = 0. 90.000
 (MAG, PHASE) T22 = .1720174E+04 -90.000
 T23 = 0. 90.000
 T33 = .1720174E+04 -90.000

NORMALIZED S11 = .2915549E-07 -90.000
 STRAIN S12 = 0. 90.000
 COMPONENTS S13 = 0. 90.000
 (MAG, PHASE) S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED U1 = .2017580E-03 0.000
 MECHANICAL U2 = 0. 0.000
 DISPLACEMENT U3 = 0. 0.000
 (MAG, PHASE)

SINGLE CRYSTAL CHROMIUM

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3734121E+04
 = .2678006E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1325613E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .7281734E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .3677674E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2746576E-03 0.000

POLYCRYSTALLINE CHROMIUM

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY = .5650214E+04
 INVERSE OF VELOCITY = .1503711E-03

DELTA V/V = 0.

POWER FLOW ANGLES PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER FLOW (RE IM) P1 = .2360826E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED STRESS COMPONENTS (MAG, PHASE) T11 = .9717667E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .2581371E+04 -90.000
 T23 = 0. 90.000
 T33 = .2581371E+04 -90.000

NORMALIZED STRAIN COMPONENTS (MAG, PHASE) S11 = .3094798E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED MECHANICAL DISPLACEMENT (MAG, PHASE) U1 = .2058107E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

POLYCRYSTALLINE CHROMIUM

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .4029818E+04
 = .2481501E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = 0.000
 P4I 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1430586E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .7564615E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .3280406E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2643885E-03 0.000

SINGLE CRYSTAL COPPER

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .4342995E+04
 = .2302558E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .1945662E+08 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= .8821931E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = .6368495E+04 -90.000
 = 0. 90.000
 = .6368495E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= .5220078E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= .2267077E-03 0.000
 = 0. 0.000
 = 0. 0.000

SINGLE CRYSTAL COPPER

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2900893E+04
 = .3447215E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PH^r 12 = 0.000
 PH^r 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1299600E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .7209993E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .4781162E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2773928E-03 0.000

ISOTROPIC COPPER

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .4848140E+04
 = .2062647E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2171967E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .9320873E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .4771083E+04 -90.000
 T23 = 0. 90.000
 T33 = .4771083E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .4425866E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2145722E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ISOTROPIC COPPER

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2395122E+04
 = .4175153E-03

DELTA ν/ν

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1073014E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6551380E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .6372938E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3052792E-03 0.000

POLYCRYSTALLINE COPPER

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .4752819E+04
 = .2104015E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2129263E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .9228787E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .4824139E+04 -90.000
 T23 = 0. 90.000
 T33 = .4824139E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .4559677E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2167132E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

POLYCRYSTALLINE COPPER

LAMSDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2321772E+04
 = .4307055E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1040154E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6450283E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .6677312E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3100639E-03 0.000

DIAMOND

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .1750366E+05
 = .5713091E-04

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .3073643E+08 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= .1108809E+05 -90.000
 = 0. 90.000
 = 0. 90.000
 = .1288114E+04 -90.000
 = 0. 90.000
 = .1288114E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= .1030492E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= .1803737E-03 0.000
 = 0. 0.000
 = 0. 0.000

DIAMOND

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1280438E+05
 = .7809827E-04

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PH 12 = 0.000
 PH 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2248449E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .9483563E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .8235119E-08 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2108912E-03 0.000

DIAMOND

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .1830129E+05
 = .5464095E-04

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .3213707E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .1133791E+05 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .2380740E+03 -90.000
 T23 = 0. 90.000
 T33 = .1204829E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .9638624E-08 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

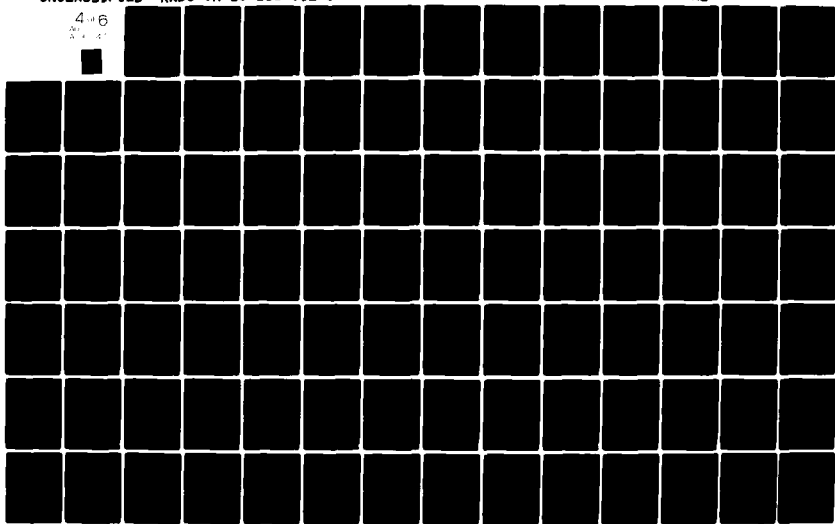
NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

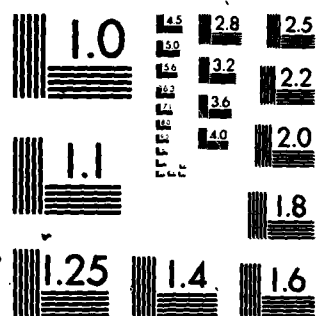
U1 = .1763993E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

AD-A090 947 ROME AIR DEVELOPMENT CENTER GRIFFISS AFB NY F/G 20/1
MICROWAVE ACOUSTICS HANDBOOK. VOLUME 3. BULK WAVE VELOCITIES.(U)
MAY 80 A J SLOBODNIK, R T DELMONICO
UNCLASSIFIED RADC-TR-80-188-VOL-3 NL

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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

DIAMOND

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1280438E+05
 = .7809827E-04

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2248449E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .9483563E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .8235119E-08 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2108912E-03 0.000

DIAMOND

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1163585E+05
 = .8594131E-04

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = -.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2043255E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .9040475E+04 -90.000
 T13 = 0. 90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .9506283E-08 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .2212273E-03 0.000
 U3 = 0. 0.000

DIAMOND

LAMBDA = 45.0000
 MU = 98.0000
 THETA = 35.2648

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .1855956E+05
 = .5388060E-04

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = .000
 PHI 13 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .3259058E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .1141763E+05 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .5486760E+03 -90.000
 T23 = 0. 90.000
 T33 = .5486650E+03 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .9438139E-08 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .1751677E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

DIAMOND

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1203796E+05
 = .8307055E-04

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P41 12 = 5.308
 P41 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2113866E+08 0.
 P2 = .1963856E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .9195359E+04 -90.000
 T22 = 0. 90.000
 T23 = .8542814E+03 -90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .9033964E-08 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2175010E-03 0.000

DIAMOND

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1203798E+05
 = .8307044E-04

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = -5.308
 P4I 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2113869E+08 0.
 P2 = -.1963922E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .9195365E+04 -90.000
 T13 = 0. 90.000
 T22 = .8542976E+03 90.000
 T23 = 0. 90.000
 T33 = .8542784E+03 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .9033947E-08 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .2175009E-03 0.000
 U3 = 0. 0.000

EUROPIUM IRON GARNET

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .6322037E+04
 = .1581769E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1985120E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .8910936E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .3798686E+04 -90.000
 T23 = 0. 90.000
 T33 = .3798686E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3550174E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2244433E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

EUROPIUM IRON GARNET

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3483354E+04
 = .2870796E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1093773E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6614449E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .4340189E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3023684E-03 0.000

EUROPIUM IRON GARNET

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .6374711E+04
 = .1568699E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2001659E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .8947981E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .3604438E+04 -90.000
 T23 = 0. 90.000
 T33 = .3751701E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3506262E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2235141E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

EUROPIUM IRON GARNET

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3483354E+04
 = .2870796F-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = 0.000
 P4I 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1093773E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6614443E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .4340199E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3023694E-03 0.000

EUROPIUM IRON GARNET

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3385996E+04
 = .2953341E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12
 P4I 13

= .000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .1063203E+08 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = .6521358E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = .4528721E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = .3066846E-03 0.000
 = 0. 0.000

EUROPIUM IRON GARNET

LAMBDA = 45.0000
 MU = 98.0000
 THETA = 35.2640

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .6392173E+04
 = .1564413E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= .000
 = .000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .2007142E+08 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= .8960223E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = .3638566E+04 -90.000
 = 0. 90.000
 = .3638564E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= .3491905E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= .2232086E-03 0.000
 = 0. 0.000
 = 0. 0.000

EUROPIUM IRON GARNET

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3418757E+04
 = .2925039E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = -1.545
 PHI 13 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1073490E+08 0.
 P2 = -.2895683E+06 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .6552831E+04 -90.000
 T13 = 0. 90.000
 T22 = .1767592E+03 90.000
 T23 = 0. 90.000
 T33 = .1767558E+03 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .4463780E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .3052116E-03 0.000
 U3 = 0. 0.000

EUROPIUM IRON GARNET

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3418756E+04
 = .2925040E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 1.545
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1073489E+08 0.
 P2 = .2895628E+06 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6552830E+04 -90.000
 T22 = 0. 90.000
 T23 = .1767559E+03 -90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .4463782E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3052117E-03 0.000

FUSED QUARTZ

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .5973426E+04
 = .1674081E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .6570769E+07 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= .5126702E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = .1051464E+04 -90.000
 = 0. 90.000
 = .1051464E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= .6530831E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= .3901143E-03 0.000
 = 0. 0.000
 = 0. 0.000

FUSED QUARTZ

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3765875E+04
 = .2655425E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .4142463E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .4070608E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .6523411E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .4913271E-03 0.000

GADOLINIUM GALLIUM GARNET

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .6347249E+04
 = .1575486E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2251369E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .9489719E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .3818465E+04 -90.000
 T23 = 0. 90.000
 T33 = .3818466E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3320406E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2107544E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

GADOLINIUM GALLIUM GARNET

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3567782E+04
 = .2802862E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P41 12 = 0.000
 P41 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1265492E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .7114751E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .3939509E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2811061E-03 0.000

GADOLINIUM GALLIUM GARNET

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .6401429E+04
 = .1562151E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = .000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2270587E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .9530135E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .3609453E+04 -90.000
 T23 = 0. 90.000
 T33 = .3770091E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3278340E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2098606E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

GADOLINIUM GALLIUM GARNET

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3567782E+04
 = .2802862E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .1265492E+08 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = 0. 90.000
 = .7114751E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = 0. 90.000
 = .3939508E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = 0. 0.000
 = .2811061E-03 0.000

GADOLINIUM GALLIUM GARNET

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3469631E+04
 = .2882151E-03

DELTA V/V

= 3.

POWER FLOW
 ANGLES

PHI 12 = -.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1230678E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .7016205E+04 -90.000
 T13 = 0. 90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .4107848E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .2850544E-03 0.000
 U3 = 0. 0.000

GADOLINIUM GALLIUM GARNET

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

R= GJLAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .6419387E+04
 = .1557781E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = .000
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2276957E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .9543493E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .3647640E+04 -90.000
 T23 = 0. 90.000
 T33 = .3647638E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3264593E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2095669E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

GADOLINIUM GALLIUM GARNET

LAMBDA = 45.0000
 NU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3502653E+04
 = .2854979E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 1.520
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1242391E+05 0.
 P2 = .3297316E+06 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .7049514E+04 -90.000
 T22 = 0. 90.000
 T23 = .1870947E+03 -90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .4049894E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2837075E-03 0.000

GADOLINIUM GALLIUM GARNET

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3502654E+04
 = .2854978E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = -1.520
 PHC 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1242392E+08 0.
 P2 = -.3297378E+06 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .7049515E+04 -90.000
 T13 = 0. 90.000
 T22 = .1870982E+03 90.000
 T23 = 0. 90.000
 T33 = .1870946E+03 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .4049892E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .2837075E-03 0.000
 U3 = 0. 0.000

GALLIUM ARSENIDE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .4733978E+04
 = .2112388E-03

DELTA V/V

= 1.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1256871E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .7090476E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .3205610E+04 -90.000
 T23 = 0. 90.000
 T33 = .3205610E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .5958383E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2820685E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

GALLIUM ARSENIDE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3347429E+04
 = .2987368E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .8887421E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .5962356E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .5010383E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3354379E-03 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = .1603322E-07 90.000
 D3 = 0. 90.000

GALLIUM ARSENIDE

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .5241799E+04
 = .1907742E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1391698E+03 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .7461093E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .1375623E+04 -90.000
 T23 = 0. 90.000
 T33 = .2751246E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .5113840E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2680572E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = .8182144E-08 90.000

GALLIUM ARSENIDE

LAMBDA = 45.0000
MU = 0.0000
THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY		=	.3354817E+04	
INVERSE OF VELOCITY		=	.2980789E-03	
DELTA V/V		=	.2203E+00	
POWER FLOW	P4T 12	=	0.000	
ANGLES	PHI 13	=	0.000	
COMPLEX POWER	P1	=	.3297352E-11	0.
FLOW (RE IM)	P2	=	0.	0.
	P3	=	0.	0.
NORMALIZED	T11	=	0.	90.000
STRESS	T12	=	0.	90.000
COMPONENTS	T13	=	.5968933E+04	90.000
(MAG, PHASE)	T22	=	0.	90.000
	T23	=	0.	90.000
	T33	=	0.	90.000
NORMALIZED	S11	=	0.	90.000
STRAIN	S12	=	0.	90.000
COMPONENTS	S13	=	.4993839E-07	90.000
(MAG, PHASE)	S22	=	0.	90.000
	S23	=	0.	90.000
	S33	=	0.	90.000
NORMALIZED	U1	=	0.	0.000
MECHANICAL	U2	=	0.	0.000
DISPLACEMENT	U3	=	.3350693E-03	180.000
(MAG, PHASE)				
ELECTRIC POTENTIAL	PHI	=	.5507029E+06	0.000
(MAG, PHASE)				
NORMALIZED ELECTRIC	E1	=	.1641529E+03	90.000
FIELD (MAG, PHASE)	E2	=	0.	90.000
	E3	=	0.	90.000
NORMALIZED ELECTRIC	D1	=	.2359196E-20	-90.000
DISPLACEMENT	D2	=	0.	90.000
(MAG, PHASE)	D3	=	0.	90.000

GALLIUM ARSENIDE

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2477773E+04
 = .4035882E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= -.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .6578488E+07 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = .5129713E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = .7867657E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = .3898854E-03 0.000
 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI

= 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1
 E2
 E3

= 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1
 D2
 D3

= 0. 90.000
 = 0. 90.000
 = .1906633E-35 90.000

GALLIUM ARSENIDE

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .5406582E+04
 = .1849597E-03

DELTA V/V

= .1130E+00

POWER FLOW
 ANGLES

PHI 12 = .000
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .3985479E-11 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .7577460E+04 90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .1742402E+04 90.000
 T23 = 0. 90.000
 T33 = .1742388E+04 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .4881840E-07 90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2639407E-03 180.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = .5009100E+06 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = .9264819E+02 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = .1128165E-12 -90.000
 D3 = 0. 90.000

GALLIUM ARSENIDE

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2797862E+04
 = .3574158E-03

DELTA V/V

= .5512E-10

POWER FLOW
 ANGLES

PHI 12 = -16.966
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .7428323E+07 0.
 P2 = -.2266218E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .5450990E+04 -90.000
 T13 = 0. 90.000
 T22 = .1662966E+04 90.000
 T23 = 0. 90.000
 T33 = .1662914E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .6556897E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .3669059E-03 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = .1211412E-07 -90.000
 D3 = 0. 90.000

GALLIUM ARSENIDE

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2797650E+04
 = .3574173E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 16.965
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .7428292E+07 0.
 P2 = .2266154E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .5450979E+04 90.000
 T22 = 0. 90.000
 T23 = .1662934E+04 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .6556938E-07 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3669066E-03 120.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = .1211396E-07 90.000

GERMANIUM

LAMBDA = 0.0080
 MU = 0.0080
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .4924238E+04
 = .2030771E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PH 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1309847E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .7238353E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .2687733E+04 -90.000
 T23 = 0. 90.000
 T33 = .2687733E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .5611134E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2763056E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

GERMANIUM

LAMBOA = 8.0000
 MU = 8.0000
 THETA = 8.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3548800E+04
 = .2817854E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .9439809E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6144855E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .4585712E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3254756E-03 0.000

GERMANIUM

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .5405546E+04
 = .1849952E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = 0.000
 P4I 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1437875E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .7583865E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .1046471E+04 -90.000
 T23 = 0. 90.000
 T33 = .2336874E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .4878652E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2637178E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

GERMANIUM

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3548800E+04
 = .2817854E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .9439809E+07 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = 0. 90.000
 = .6144855E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = 0. 90.000
 = .4585712E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = 0. 0.000
 = .3254756E-03 0.000

GERMANIUM

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2760830E+04
 = .3622100E-03

DELTA ν/ν

= 0.

POWER FLOW
 ANGLES

P4I 12 = .000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .7343807E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .5419892E+04 -90.000
 T13 = 0. 90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .6682974E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .3690111E-03 0.000
 U3 = 0. 0.000

GERMANIUM

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .5556725E+04
 = .1799621E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= .000
 = .000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .1478089E+08 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= .7689184E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = .1416764E+04 -90.000
 = 0. 90.000
 = .1416750E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= .4680916E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= .2601056E-03 0.000
 = 0. 0.000
 = 0. 0.000

GERMANIUM

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3046214E+04
 = .3282764E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 14.175
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .8102928E+07 0.
 P2 = .2046572E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .5693129E+04 90.000
 T22 = 0. 90.000
 T23 = .1437924E+04 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .5766186E-07 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3513007E-03 180.000

GERMANIUM

LAMBOA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3046224E+04
 = .3282753E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = -14.175
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .8102956E+07 0.
 P2 = -.2046631E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .5693138E+04 -90.000
 T13 = 0. 90.000
 T22 = .1437952E+04 90.000
 T23 = 0. 90.000
 T33 = .1437910E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .5766157E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .3513001E-03 0.000
 U3 = 0. 0.000

SINGLE CRYSTAL GOLD

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .3129336E+04
 = .3195566E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .3019810E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .1099056E+05 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .9246026E+04 -90.000
 T23 = 0. 90.000
 T33 = .9246026E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .5815111E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .1819744E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

SINGLE CRYSTAL GOLD

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1485683E+04
 = .6730911E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = 0.000
 P4I 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1433684E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .7572804E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .8888268E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2641030E-03 0.000

ISOTROPIC GOLD

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .3377763E+04
 = .2960534E-03

DELTA V/V

= 1.

POWER FLOW
 ANGLES

P4I 12 = 0.000
 P4I 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .3259548E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .1141849E+05 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .8317555E+04 -90.000
 T23 = 0. 90.000
 T33 = .8317555E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .5185508E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .1751545E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ISOTROPIC GOLD

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1244678E+04
 = .8034208E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .1201114E+08 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = 0. 90.000
 = .6931419E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = 0. 90.000
 = .1159100E-06 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = 0. 0.000
 = .2885412E-03 0.000

INDIUM ANTIMONIDE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY	=	.3412689E+04	
INVERSE OF VELOCITY	=	.2930241E-03	
DELTA V/V	=	0.	
POWER FLOW	PHI 12	=	0.000
ANGLES	PHI 13	=	0.000
COMPLEX POWER	P1	=	.9845608E+07 0.
FLOW (RE IM)	P2	=	0. 0.
	P3	=	0. 0.
NORMALIZED	T11	=	.6275542E+04 -90.000
STRESS	T12	=	0. 90.000
COMPONENTS	T13	=	0. 90.000
(MAG, PHASE)	T22	=	.3427268E+04 -90.000
	T23	=	0. 90.000
	T33	=	.3427268E+04 -90.000
NORMALIZED	S11	=	.9338605E-07 -90.000
STRAIN	S12	=	0. 90.000
COMPONENTS	S13	=	0. 90.000
(MAG, PHASE)	S22	=	0. 90.000
	S23	=	0. 90.000
	S33	=	0. 90.000
NORMALIZED	U1	=	.3186976E-03 0.000
MECHANICAL	U2	=	0. 0.000
DISPLACEMENT	U3	=	0. 0.000
(MAG, PHASE)			
ELECTRIC POTENTIAL	PHI	=	0. 0.000
(MAG, PHASE)			
NORMALIZED ELECTRIC	E1	=	0. 90.000
FIELD (MAG, PHASE)	E2	=	0. 90.000
	E3	=	0. 90.000
NORMALIZED ELECTRIC	D1	=	0. 90.000
DISPLACEMENT	D2	=	0. 90.000
(MAG, PHASE)	D3	=	0. 90.000

INDIUM ANTIMONIDE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2287787E+04
 = .4371037E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .6600265E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .5138196E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .8506947E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3892417E-03 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PH = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = .1207987E-07 90.000
 D3 = 0. 90.000

INDIUM ANTIMONIDE

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .3773253E+04
 = .2650233E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = 0.000
 P4I 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1088583E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .6598737E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .1747079E+04 -90.000
 T23 = 0. 90.000
 T33 = .2947945E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .8032547E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .3030883E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = .5703108E-08 90.000

INDIUM ANTIMONIDE

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2289136E+04
 = .4368461E-03

DELTA V/V

= .5893E-01

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .2623092E-10 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = 0. 90.000
 = .5139711E+04 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = 0. 90.000
 = .8499429E-07 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = 0. 0.000
 = .3891259E-03 100.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI

= .1952510E+06 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1
 E2
 E3

= .8529462E+02 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1
 D2
 D3

= .1829037E-19 90.000
 = 0. 90.000
 = 0. 90.000

INDIUM ANTIMONIDE

LAMBDA = 45.0000
MU = 0.0000
THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
INVERSE OF VELOCITY

= .1625725E+04
= .6151103E-03

DELTA V/V

= 0.

POWER FLOW
ANGLES

PHI 12
PHI 13

= .000
= 0.000

COMPLEX POWER
FLOW (RE IM)

P1
P2
P3

= .4690216E+07 0.
= 0. 0.
= 0. 0.

NORMALIZED
STRESS
COMPONENTS
(MAG, PHASE)

T11
T12
T13
T22
T23
T33

= 0. 90.000
= .4331381E+04 -90.000
= 0. 90.000
= 0. 90.000
= 0. 90.000
= 0. 90.000

NORMALIZED
STRAIN
COMPONENTS
(MAG, PHASE)

S11
S12
S13
S22
S23
S33

= 0. 90.000
= .1420125E-06 -90.000
= 0. 90.000
= 0. 90.000
= 0. 90.000
= 0. 90.000

NORMALIZED
MECHANICAL
DISPLACEMENT
(MAG, PHASE)

U1
U2
U3

= 0. 0.000
= .4617465E-03 0.000
= 0. 0.000

ELECTRIC POTENTIAL
(MAG, PHASE)

PH

= 0. 0.000

NORMALIZED ELECTRIC
FIELD (MAG, PHASE)

E1
E2
E3

= 0. 90.000
= 0. 90.000
= 0. 90.000

NORMALIZED ELECTRIC
DISPLACEMENT
(MAG, PHASE)

D1
D2
D3

= 0. 90.000
= 0. 90.000
= .1527167E-35 90.000

INDIUM ANTIMONIDE

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .3887072E+04
 = .2572630E-03

DELTA V/V

= .2725E-01

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= .000
 = .000

COMPLEX POWER
 FLOW (RE IN)

P1
 P2
 P3

= .3340611E-10 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= .6697523E+04 90.000
 = 0. 90.000
 = 0. 90.000
 = .2051926E+04 90.000
 = 0. 90.000
 = .2051913E+04 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= .7682334E-07 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= .2986179E-03 180.000
 = 0. 0.000
 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI

= .1730163E+06 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1
 E2
 E3

= .4451070E+02 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1
 D2
 D3

= 0. 90.000
 = .7926477E-13 -90.000
 = 0. 90.000

INDIUM ANTIMONIDE

LAMBDA = 45.0000
 MU = 98.0000
 THETA = 35.2640

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1872608E+04
 = .5340146E-03

DELTA V/V

= .1572E-10

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= -19.204
 = .000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .5402474E+07 0.
 = -.1881786E+07 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = .4648644E+04 -90.000
 = 0. 90.000
 = .1619203E+04 90.000
 = 0. 90.000
 = .1619147E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = .1148753E-06 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = .4302330E-03 0.000
 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI

= 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1
 E2
 E3

= 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1
 D2
 D3

= 0. 90.000
 = .9418001E-08 -90.000
 = 0. 90.000

INDIUM ANTIMONIDE

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1872599E+04
 = .5340172E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 19.204
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .5402448E+07 0.
 P2 = .1881733E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .4648633E+04 90.000
 T22 = 0. 90.000
 T23 = .1619171E+04 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .1148762E-06 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .4302340E-03 180.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PH = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = .9417887E-08 90.000

INDIUM ARSENIDE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .3822601E+04
 = .2616020E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1089441E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .6601337E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .3587184E+04 -90.000
 T23 = 0. 90.000
 T33 = .3587184E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .7925726E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .3029689E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

INDIUM ARSENIDE

LAMBDA = 0.0000
MU = 0.0000
THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY	=	.2635453E+04	
INVERSE OF VELOCITY	=	.3794414E-03	
DELTA V/V	=	0.	
POWER FLOW	PH ^r 12	=	0.000
ANGLES	PH ^r 13	=	0.000
COMPLEX POWER	P1	=	.7511042E+07 0.
FLOW (RE IM)	P2	=	0. 0.
	P3	=	0. 0.
NORMALIZED	T11	=	0. 90.000
STRESS	T12	=	0. 90.000
COMPONENTS	T13	=	.5481256E+04 -90.000
(MAG, PHASE)	T22	=	0. 90.000
	T23	=	0. 90.000
	T33	=	0. 90.000
NORMALIZED	S11	=	0. 90.000
STRAIN	S12	=	0. 90.000
COMPONENTS	S13	=	.6922525E-07 -90.000
(MAG, PHASE)	S22	=	0. 90.000
	S23	=	0. 90.000
	S33	=	0. 90.000
NORMALIZED	U1	=	0. 0.000
MECHANICAL	U2	=	0. 0.000
DISPLACEMENT	U3	=	.3648799E-03 0.000
(MAG, PHASE)			
ELECTRIC POTENTIAL	PHI	=	0. 0.000
(MAG, PHASE)			
NORMALIZED ELECTRIC	E1	=	0. 90.000
FIELD (MAG, PHASE)	E2	=	0. 90.000
	E3	=	0. 90.000
NORMALIZED ELECTRIC	O1	=	0. 90.000
DISPLACEMENT	O2	=	.6230273E-08 90.000
(MAG, PHASE)	O3	=	0. 90.000

INDIUM ARSENIDE

LAMBOA = 45.0000
 MU = 0.0080
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .4268715E+04
 = .2342625E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1216584E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .6975912E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .1657925E+04 -90.000
 T23 = 0. 90.000
 T33 = .3039809E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .6716326E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2867008E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = .3022347E-08 90.000

INDIUM ARSENIDE

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2635980E+04
 = .3793656E-03

DELTA V/V

= .1997E-01

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .6078295E-10 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .5481804E+04 90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .6920452E-07 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3648434E-03 180.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PH = .1282653E+06 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = .4865943E+02 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = .3663232E-22 90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

INDIUM ARSENIDE

LAMBDA = 45.0000
 NU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1826462E+04
 = .5475065E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = .000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .5205415E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .4563077E+04 -90.000
 T13 = 0. 90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .1199862E-06 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .4383007E-03 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PH = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = .8177972E-36 90.000

INDIUM ARSENIDE

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .4407817E+04
 = .2268697E-03

DELTA V/V

= .9524E-02

POWER FLOW
 ANGLES

PHI 12 = .000
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .7622976E-10 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .7088661E+04 90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .2018395E+04 90.000
 T23 = 0. 90.000
 T33 = .2018391E+04 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .6400919E-07 90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2821407E-03 180.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = .1145349E+05 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = .2598449E+02 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = .4158061E-13 -90.000
 D3 = 0. 90.000

INDIUM ARSENIDE

LAMBDA = 45.0000
MU = 90.0000
THETA = 35.2640

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
INVERSE OF VELOCITY

= .2130541E+04
= .4693644E-03

DELTA V/V

= .5300F-11

POWER FLOW
ANGLES

PH 12 = -20.550
PH 13 = .000

COMPLEX POWER
FLOW (RE IM)

P1 = .6072042E+07 0.
P2 = -.2276280E+07 0.
P3 = 0. 0.

NORMALIZED
STRESS
COMPONENTS
(MAG, PHASE)

T11 = 0. 90.000
T12 = .4928303E+04 -90.000
T13 = 0. 90.000
T22 = .1847505E+04 90.000
T23 = 0. 90.000
T33 = .1847443E+04 -90.000

NORMALIZED
STRAIN
COMPONENTS
(MAG, PHASE)

S11 = 0. 90.000
S12 = .9523855E-07 -90.000
S13 = 0. 90.000
S22 = 0. 90.000
S23 = 0. 90.000
S33 = 0. 90.000

NORMALIZED
MECHANICAL
DISPLACEMENT
(MAG, PHASE)

U1 = 0. 0.000
U2 = .4058192E-03 0.000
U3 = 0. 0.000

ELECTRIC POTENTIAL
(MAG, PHASE)

P4I = 0. 0.000

NORMALIZED ELECTRIC
FIELD (MAG, PHASE)

E1 = 0. 90.000
E2 = 0. 90.000
E3 = 0. 90.000

NORMALIZED ELECTRIC
DISPLACEMENT
(MAG, PHASE)

D1 = 0. 90.000
D2 = .4948788E-08 -90.000
D3 = 0. 90.000

INDIUM ARSENIDE

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2130530E+04
 = .4693668E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 20.550
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .6072011E+07 0.
 P2 = .2276218E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .4928290E+04 90.000
 T22 = 0. 90.000
 T23 = .1847471E+04 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .9523929E-07 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .4058203E-03 180.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PH = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = .4948730E-08 90.000

SINGLE CRYSTAL LEAD

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .2029323E+04
 = .4927752E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PH 12 = 0.000
 PH 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1185124E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .6885127E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .5840191E+04 -90.000
 T23 = 0. 90.000
 T33 = .5840191E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .1431419E-06 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2904812E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

SINGLE CRYSTAL LEAD

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1118034E+04
 = .8944272E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .6529318E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .5110505E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .1750173E-06 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3913507E-03 0.000

LEAD MOLYBDATE

LAMBDA = 98.0000
 MU = 98.0000
 THETA = 8.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .4006740E+04
 = .2495794E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = .000
 PHI 13 = -15.088

COMPLEX POWER
 FLOW (RE IM)

P1 = .1392342E+08 0.
 P2 = 0. 0.
 P3 = -.3753791E+07 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .7351556E+04 -90.000
 T12 = 0. 90.000
 T13 = .1283865E+04 90.000
 T22 = .3478932E+04 -90.000
 T23 = 0. 90.000
 T33 = .4343715E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .6588887E-07 -90.000
 S12 = 0. 90.000
 S13 = .5753372E-08 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2639996E-03 0.000
 U2 = 0. 0.000
 U3 = .4610453E-04 180.000

LEAD MOLYBDATE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2123012E+04
 = .4710288E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= -.000
 = 43.839

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .7377468E+07 0.
 = 0. 0.
 = .7084493E+07 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= .9345452E+03 -90.000
 = 0. 90.000
 = .5351305E+04 -90.000
 = .1575231E+04 -90.000
 = 0. 90.000
 = .4360977E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= .2983393E-07 -90.000
 = 0. 90.000
 = .8541617E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= .6333780E-04 0.000
 = 0. 0.000
 = .3626792E-03 0.000

LEAD MOLYBDATE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1960032E+04
 = .5101957E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = 0.000
 P4I 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .6811112E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .5219622E+04 -90.000
 T13 = 0. 90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .9774572E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .3831695E-03 0.000
 U3 = 0. 0.000

LEAD MOLYBOATE

LAMBOA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .3632388E+04
 = .2753010E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = -.000
 PH 13 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1262255E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .7105645E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .4091364E+04 -90.000
 T23 = 0. 90.000
 T33 = .4091364E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .7748795E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2814663E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

LEAD MOLYBDATE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1960032E+04
 = .5101957E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = .000
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .6811112E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .5219622E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .9774572E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3831695E-03 0.000

LEAD MOLYBDATE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .4006740E+04
 = .2495794E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = 15.088
 P4I 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1392342E+08 0.
 P2 = .3753791E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .7351555E+04 -90.000
 T12 = .1283866E+04 -90.000
 T13 = 0. 90.000
 T22 = .4343718E+04 -90.000
 T23 = 0. 90.000
 T33 = .3478932E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .6588887E-07 -90.000
 S12 = .5753372E-08 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2639995E-03 0.000
 U2 = .4610453E-04 0.000
 U3 = 0. 0.000

LEAD MOLYBDATE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2123012E+04
 = .4710288E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = -43.839
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .7377468E+07 0.
 P2 = -.7084493E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .9345452E+03 90.000
 T12 = .5351308E+04 -90.000
 T13 = 0. 90.000
 T22 = .4360977E+04 90.000
 T23 = 0. 90.000
 T33 = .1575231E+04 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .2983393E-07 90.000
 S12 = .8541617E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .6333780E-04 180.000
 U2 = .3626792E-03 0.000
 U3 = 0. 0.000

LEAD MOLYBDATE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1960032E+04
 = .5101957E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .6811112E+07 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = 0. 90.000
 = .5219622E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = 0. 90.000
 = .9774572E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = 0. 0.000
 = .3831695E-03 0.000

LEAD SULPHIDE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .4066120E+04
 = .2459347E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PH^{*} 12 = 0.000
 PH^{*} 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1524795E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .7809725E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .2078395E+04 -90.000
 T23 = 0. 90.000
 T33 = .2078395E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .6298165E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2560910E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

LEAD SULPHIDE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1751190E+04
 = .5710402E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .6566963E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .5125217E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .1114178E-06 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3902274E-03 0.000

LEAD SULPHIDE

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .3678768E+04
 = .2718301E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = 0.000
 P4I 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1379538E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .7428426E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .4061849E+04 -90.000
 T23 = 0. 90.000
 T33 = .2415153E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .7318647E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2692360E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

LEAD SULPHIDE

LAMBDA = 45.0000
 MU = 0.0080
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2463060E+04
 = .4059990E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = -.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .9236477E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .6078314E+04 -90.000
 T13 = 0. 90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .6679466E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .3290385E-03 0.000
 U3 = 0. 0.000

LEAD SULPHIDE

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1751190E+04
 = .5710402E-03

DELTA ν/ν

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .6566963E+07 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = 0. 90.000
 = .5125217E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = 0. 90.000
 = .1114178E-06 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = 0. 0.000
 = .3902274E-03 0.000

LEAD SULPHIDE

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .3540245E+04
 = .2024663E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= -.000
 = .000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .1327592E+03 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= .7287227E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = .3721123E+04 -90.000
 = 0. 90.000
 = .3721151E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= .7752369E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= .2744528E-03 0.000
 = 0. 0.000
 = 0. 0.000

LEAD SULPHIDE

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2250930E+04
 = .4442608E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = -15.595
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .8440983E+07 0.
 P2 = -.2356037E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .5810676E+04 90.000
 T21 = 0. 90.000
 T23 = .1621863E+04 -90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .7645597E-07 90.000
 S21 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3441941E-03 180.000

LEAD SULPHIDE

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2250921E+04
 = .4442625E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 15.596
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .8440955E+07 0.
 P2 = .2356161E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .5810665E+04 -90.000
 T13 = 0. 90.000
 T22 = .1621935E+04 -90.000
 T23 = 0. 90.000
 T33 = .1621851E+04 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .7645640E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .3441947E-03 0.000
 U3 = 0. 0.000

LITHIUM NIOBATE (SMITH AND WELSH)

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .6883078E+04
 = .1452838E-03

DELTA V/V

= .3785E+01

POWER FLOW
 ANGLES

PHI 12 = 9.384
 PHI 13 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .3004440E-12 0.
 P2 = .4965392E-13 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .7936030E+04 -90.000
 T12 = .9457212E+03 -90.000
 T13 = 0. 90.000
 T22 = .2714800E+04 -90.000
 T23 = 0. 90.000
 T33 = .1461076E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3610106E-07 -90.000
 S12 = .2151046E-08 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2484864E-03 0.000
 U2 = .2961164E-04 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = .1824392E+07 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = .2650547E+03 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = .8303244E-08 -90.000
 D3 = 0. 90.000

LITHIUM NIOBATE (SMITH AND WELSH)

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .4496182E+04
 = .2224109E-03

DELTA V/V

= .2069E+02

POWER FLOW
 ANGLES

PHI 12 = -12.093
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1349782E-12 0.
 P2 = -.2891900E-13 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .7643526E+03 90.000
 T12 = .6414073E+04 -90.000
 T13 = 0. 90.000
 T22 = .6127816E+03 90.000
 T23 = 0. 90.000
 T33 = .1356752E+04 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .8148692E-08 90.000
 S12 = .3418992E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .3663801E-04 180.000
 U2 = .3074482E-03 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PH = .2721875E+07 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = .6053747E+03 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = .1874199E-09 90.000
 D3 = 0. 90.000

LITHIUM NIOBATE (SMITH AND WELSH)

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3962377E+04
 = .2523738E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P41 12 = 6.655
 PH 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .9192715E+07 0.
 P2 = .1072589E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6063898E+04 -90.000
 T22 = 0. 90.000
 T23 = .7075241E+03 -90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .4161907E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3298209E-03 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = .2022687E-06 90.000

LITHIUM NIOBATE (SMITH AND WELSH)

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .7333813E+04
 = .1363547E-03

DELTA V/V

= .1445E+01

POWER FLOW
 ANGLES

P4I 12 = .000
 P4I 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .5868248E-12 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .8249714E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .2526814E+04 -90.000
 T23 = 0. 90.000
 T33 = .2526814E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3305643E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2424325E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PH = .1305407E+07 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = .1779983E+03 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = .2108998E-20 -90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

LITHIUM NIOBATE (SMITH AND WELSH)

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3580960E+04
 = .2792547E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12
 P4I 13

= 8.130
 = .490

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .6307828E+07 0.
 = .1186833E+07 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = .5764660E+04 -90.000
 = 0. 90.000
 = .8235229E+03 -90.000
 = 0. 90.000
 = .8235229E+03 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = .4644253E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = .3469415E-03 0.000
 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

P4I

= 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1
 E2
 E3

= 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1
 D2
 D3

= 0. 90.000
 = .3642878E-06 -90.000
 = 0. 90.000

LITHIUM NIOBATE (SMITH AND WELSH)

LA43DA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .358096E+04
 = .2792547E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = -8.136
 P4I 13 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .8367828E+07 J.
 P2 = -.1186833E+07 J.
 P3 = 0. J.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .5764660E+04 -90.000
 T22 = 0. 90.000
 T23 = .8235229E+03 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .4844253E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3469415E-03 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

P4I = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = .3642878E-06 -90.000

LITHIUM NIOBATE (SMITH AND WELSH)

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .6614378E+04
 = .1511858E-03

DELTA V/V

= 0.

POWER FLOW -
 ANGLES

PHI 12
 PHI 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .1534535E+08 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= .7834630E+04 -90.000
 = 0. 30.000
 = 0. 90.000
 = .2211450E+04 -90.000
 = .3280510E+03 -90.000
 = .2902287E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= .3859424E-07 -90.000
 = 3. 90.000
 = 0. 90.000
 = 0. 90.000
 = 3. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= .2552769E-03 0.000
 = 0. 0.000
 = 3. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI

= 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1
 E2
 E3

= 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1
 D2
 D3

= 0. 90.000
 = .9378400E-07 90.000
 = .8876675E-08 -90.000

LITHIUM NIOBATE (SMITH AND WELSH)

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .4802878E+04
 = .2082085E-03

DELTA V/V

= .1519E+02

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .8605343E-13 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .4087870E+04 90.000
 T13 = .5278260E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .1909616E-07 90.000
 S13 = .2465697E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .1834330E-03 190.000
 U3 = .2368488E-03 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = .3408913E+07 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = .7097646E+03 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = .1376849E-20 90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

LITHIUM NIOBATE (SMITH AND WELSH)

LAMBDA = 0.0080
MU = 0.0000
THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
INVERSE OF VELOCITY

= .4058967E+04
= .2463681E-03

DELTA V/V

= .1490E+02

POWER FLOW
ANGLES

PHI 12 = 0.000
PHI 13 = 0.000

COMPLEX POWER
FLOW (RE IM)

P1 = .9963595E-11 0.
P2 = 0. 0.
P3 = 0. 0.

NORMALIZED
STRESS
COMPONENTS
(MAG, PHASE)

T11 = 0. 90.000
T12 = .4852301E+04 -90.000
T13 = .3757977E+04 -90.000
T22 = 0. 90.000
T23 = 0. 90.000
T33 = 0. 90.000

NORMALIZED
STRAIN
COMPONENTS
(MAG, PHASE)

S11 = 0. 90.000
S12 = .3173721E-07 -90.000
S13 = .2457961E-07 -90.000
S22 = 0. 90.000
S23 = 0. 90.000
S33 = 0. 90.000

NORMALIZED
MECHANICAL
DISPLACEMENT
(MAG, PHASE)

U1 = 0. 0.000
U2 = .2576406E-03 0.000
U3 = .1995357E-03 0.000

ELECTRIC POTENTIAL
(MAG, PHASE)

PHI = .3168049E+06 0.000

NORMALIZED ELECTRIC
FIELD (MAG, PHASE)

E1 = .7805063E+02 90.000
E2 = 0. 90.000
E3 = 0. 90.000

NORMALIZED ELECTRIC
DISPLACEMENT
(MAG, PHASE)

D1 = .2072895E-19 -90.000
D2 = 0. 90.000
D3 = 0. 90.000

ISOTROPIC LITHIUM NIOBATE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY	=	.6747261E+04	
INVERSE OF VELOCITY	=	.1482083E-03	
DELTA V/V	=	0.	
POWER FLOW	PH 12	=	0.000
ANGLES	PH 13	=	0.000
COMPLEX POWER	P1	=	.1585605E+08 0.
FLOW (RE IM)	P2	=	0. 0.
	P3	=	0. 0.
NORMALIZED	T11	=	.7963935E+04 -90.000
STRESS	T12	=	0. 90.000
COMPONENTS	T13	=	0. 90.000
(MAG, PHASE)	T22	=	.2512713E+04 -90.000
	T23	=	0. 90.000
	T33	=	.2512713E+04 -90.000
NORMALIZED	S11	=	.3721987E-07 -90.000
STRAIN	S12	=	0. 90.000
COMPONENTS	S13	=	0. 90.000
(MAG, PHASE)	S22	=	0. 90.000
	S23	=	0. 90.000
	S33	=	0. 90.000
NORMALIZED	U1	=	.2511321E-03 0.000
MECHANICAL	U2	=	0. 0.000
DISPLACEMENT	U3	=	0. 0.000
(MAG, PHASE)			

ISOTROPIC LITHIUM NIOBATE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3947259E+04
 = .2533404E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .9276058E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6091324E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .4159036E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3283358E-03 0.000

LITHIUM TANTALATE (SMITH AND WELSH)

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY	=	.5688867E+04	
INVERSE OF VELOCITY	=	.1757819E-03	
DELTA V/V	=	.2227E+01	
POWER FLOW	PHI 12	=	12.633
ANGLES	PHI 13	=	-.000
COMPLEX POWER	P1	=	.6672657E-12 0.
FLOW (RE IM)	P2	=	.1495554E-12 0.
	P3	=	0. 0.
NORMALIZED	T11	=	.9063772E+04 -90.000
STRESS	T12	=	.1630233E+04 -90.000
COMPONENTS	T13	=	0. 90.000
(MAG, PHASE)	T22	=	.3050873E+04 -90.000
	T23	=	0. 90.000
	T33	=	.1223531E+04 -90.000
NORMALIZED	S11	=	.3757233E-07 -90.000
STRAIN	S12	=	.3378927E-08 -90.000
COMPONENTS	S13	=	0. 90.000
(MAG, PHASE)	S22	=	0. 90.000
	S23	=	0. 90.000
	S33	=	0. 90.000
NORMALIZED	U1	=	.2137440E-03 0.000
MECHANICAL	U2	=	.3844453E-04 0.000
DISPLACEMENT	U3	=	0. 0.000
(MAG, PHASE)			
ELECTRIC POTENTIAL	PHI	=	.1224195E+07 0.000
(MAG, PHASE)			
NORMALIZED ELECTRIC	E1	=	.2151914E+03 90.000
FIELD (MAG, PHASE)	E2	=	0. 90.000
	E3	=	0. 90.000
NORMALIZED ELECTRIC	D1	=	0. 90.000
DISPLACEMENT	D2	=	.1427749E-07 90.000
(MAG, PHASE)	D3	=	0. 90.000

LITHIUM TANTALATE (SMITH AND WELSH)

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3882959E+04
 = .2575356E-03

DELTA V/V

= .7581E+01

POWER FLOW
 ANGLES

PHI 12 = -16.506
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .3626889E-12 0.
 P2 = -.1074737E-12 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .1346847E+04 90.000
 T12 = .7488201E+04 -90.000
 T13 = 0. 90.000
 T22 = .9731041E+03 90.000
 T23 = 0. 90.000
 T33 = .1934383E+04 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .1198404E-07 90.000
 S12 = .3331444E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .4653353E-04 180.000
 U2 = .2587172E-03 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = .1660477E+07 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = .4276319E+03 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = .4553935E-08 -90.000
 D3 = 0. 90.000

LITHIUM TANTALATE (SMITH AND WELSH)

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3530313E+04
 = .2832610E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = -6.388
 PHI 13 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1315748E+08 0.
 P2 = -.1472957E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .7254647E+04 -90.000
 T22 = 0. 90.000
 T23 = .8121456E+03 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .3904546E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2756854E-03 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = .1304118E-06 90.000

LITHIUM TANTALATE (SMITH AND WELSH)

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY	=	.6160962E+04	
INVERSE OF VELOCITY	=	.1623123E-03	
DELTA V/V	=	.5555E+00	
POWER FLOW	P4' 12	=	-.000
ANGLES	P4' 13	=	-.000
COMPLEX POWER	P1	=	.2776089E-11 0.
FLOW (RE IM)	P2	=	0. 0.
	P3	=	0. 0.
NORMALIZED	T11	=	.9583715E+04 -90.000
STRESS	T12	=	0. 90.000
COMPONENTS	T13	=	0. 90.000
(MAG, PHASE)	T22	=	.2713430E+04 -90.000
	T23	=	0. 90.000
	T33	=	.2713430E+04 -90.000
NORMALIZED	S11	=	.3387252E-07 -90.000
STRAIN	S12	=	0. 90.000
COMPONENTS	S13	=	0. 90.000
(MAG, PHASE)	S22	=	0. 90.000
	S23	=	0. 90.000
	S33	=	0. 90.000
NORMALIZED	U1	=	.2086873E-03 0.000
MECHANICAL	U2	=	0. 0.000
DISPLACEMENT	U3	=	0. 0.000
(MAG, PHASE)			
ELECTRIC POTENTIAL	PHI	=	.6001825E+06 0.000
(MAG, PHASE)			
NORMALIZED ELECTRIC	E1	=	.9741702E+02 90.000
FIELD (MAG, PHASE)	E2	=	0. 90.000
	E3	=	0. 90.000
NORMALIZED ELECTRIC	D1	=	.8484412E-20 90.000
DISPLACEMENT	D2	=	0. 90.000
(MAG, PHASE)	D3	=	0. 90.000

LITHIUM TANTALATE (SMITH AND WELSH)

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3603653E+04
 = .2774962E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = -6.132
 PHI 13 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1343082E+08 0.
 P2 = -.1442983E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .7329615E+04 -90.000
 T13 = 0. 90.000
 T22 = .7874793E+03 90.000
 T23 = 0. 90.000
 T33 = .7874793E+03 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .3785958E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .2729656E-13 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = .2059561E-06 -90.000
 D3 = 0. 90.000

LITHIUM TANTALATE (SMITH AND WELSH)

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3603653E+04
 = .2774962E-03

DELTA V/V

= .5173E-12

POWER FLOW
 ANGLES

P4I 12 = 6.132
 P4I 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1343682E+08 J.
 P2 = .1442980E+07 0.
 P3 = 0. J.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .7329615E+04 -90.000
 T22 = 0. 90.000
 T23 = .7874793E+03 -90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .3785958E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2728656E-03 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

P4I = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = .2059561E-06 -90.000

LITHIUM TANTALATE (SMITH AND WELSH)

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .5552395E+04
 = .1801025E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2069377E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .9098082E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .1742017E+04 -90.000
 T23 = .4117496E+03 90.000
 T33 = .3214814E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3959131E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2198265E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = .6611748E-07 90.000
 D3 = .1504470E-07 90.000

LITHIUM TANTALATE (SMITH AND WELSH)

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .4211571E+04
 = .2374411E-03

DELTA V/V

= .1070E+02

POWER FLOW
 ANGLES

PH 12 = 0.000
 PH 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2198450E-12 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .4558595E+04 90.000
 T13 = .6481150E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .1723945E-07 90.000
 S13 = .2451007E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .1452103E-03 180.000
 U3 = .2064518E-03 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PH = .2132759E+07 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = .5064046E+03 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

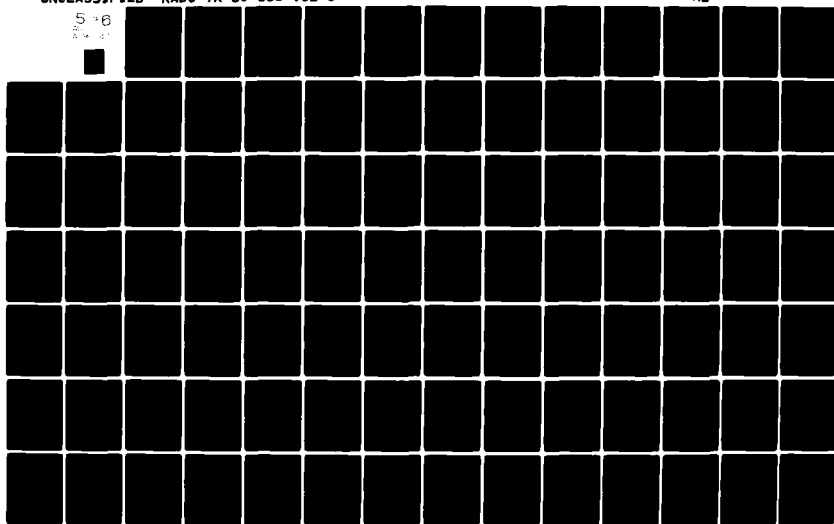
NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

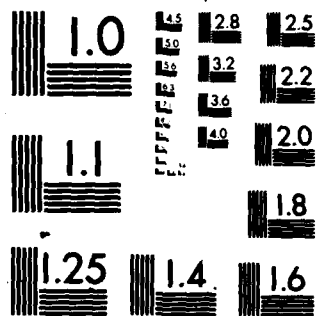
D1 = .2584243E-20 90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

AD-A090 947 ROME AIR DEVELOPMENT CENTER GRIFFISS AFB NY F/G 20/1
MICROWAVE ACOUSTICS HANDBOOK, VOLUME 3, BULK WAVE VELOCITIES. (U)
MAY 80 A J SLOBODNIK, R T DELMONICO
UNCLASSIFIED RADC-TR-80-188-VOL-3 NL

528

528





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

LITHIUM TANTALATE (SMITH AND WELSH)

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY = .3367086E+04
 INVERSE OF VELOCITY = .2969928E-03

DELTA V/V = .1416E+00

POWER FLOW P4I 12 = 0.000
 ANGLES P4I 13 = 0.000

COMPLEX POWER P1 = 4509469E-10 0.
 FLOW (RE IM) P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED T11 = 0. 90.000
 STRESS T12 = .5795049E+04 -90.000
 COMPONENTS T13 = .4076018E+04 -90.000
 (MAG, PHASE) T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED S11 = 0. 90.000
 STRAIN S12 = .3428699E-07 -90.000
 COMPONENTS S13 = .2411617E-07 -90.000
 (MAG, PHASE) S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED U1 = 0. 0.000
 MECHANICAL U2 = .2308945E-03 0.000
 DISPLACEMENT U3 = .1624024E-03 0.000
 (MAG, PHASE)

ELECTRIC POTENTIAL PHI = .1489146E+05 0.000
 (MAG, PHASE)

NORMALIZED ELECTRIC E1 = .4422655E+02 90.000
 FIELD (MAG, PHASE) E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC D1 = .1443507E-19 90.000
 DISPLACEMENT D2 = 0. 90.000
 (MAG, PHASE) D3 = 0. 90.000

MAGNESIUM OXIDE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .9095272E+04
 = .1099472E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1629418E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .8073210E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .2587567E+04 -90.000
 T23 = 0. 90.000
 T33 = .2587567E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .2723755E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2477329E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

MAGNESIUM OXIDE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .6598404E+04
 = .1515519E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1182104E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6876348E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .2203958E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2908521E-03 0.000

MAGNESIUM OXIDE

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .9907470E+04
 = .1009339E-03

DELTA V/V

= 3.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1774923E+08 0.
 P2 = 0. 0.
 P3 = 0 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .8425968E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .9511257E+03 -90.000
 T23 = 0. 90.000
 T33 = .2275994E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .2395783E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2373615E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

MAGNESIUM OXIDE

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .6598404E+04
 = .1515518E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1182104E+06 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6876348E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .2203958E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2908521E-03 0.000

MAGNESIUM OXIDE

LAMBDA = 45.0000
ML = 0.0000
THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
INVERSE OF VELOCITY

= .5301409E+04
= .1886291E-03

DELTA V/V

= 0.

POWER FLOW
ANGLES

P4I 12 = 0.000
PH 13 = 0.000

COMPLEX POWER
FLOW (RE IM)

P1 = .9497475E+07 0.
P2 = 0. 0.
P3 = 0. 0.

NORMALIZED
STRESS
COMPONENTS
(MAG, PHASE)

T11 = 0. 90.000
T12 = .6163595E+04 -90.000
T13 = 0. 90.000
T22 = 0. 90.000
T23 = 0. 90.000
T33 = 0. 90.000

NORMALIZED
STRAIN
COMPONENTS
(MAG, PHASE)

S11 = 0. 90.000
S12 = .3060375E-07 -90.000
S13 = 0. 90.000
S22 = 0. 90.000
S23 = 0. 90.000
S33 = 0. 90.000

NORMALIZED
MECHANICAL
DISPLACEMENT
(MAG, PHASE)

U1 = 0. 0.000
U2 = .3244860E-03 0.000
U3 = 0. 0.000

MAGNESIUM OXIDE

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .1016379E+05
 = .9838849E-04

DELTA ν/ν

= 0.

POWER FLOW
 ANGLES

PHI 12 = .000
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1820843E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .8534267E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .1340403E+04 -90.000
 T23 = 0. 90.000
 T33 = .1340389E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .2305725E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2343493E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

MAGNESIUM OXIDE

LAMBDA = 45.0000
 ML = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .5766238E+04
 = .1734233E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 12.343
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1033022E+08 0.
 P2 = .2260446E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6428131E+04 90.000
 T22 = 0. 90.000
 T23 = .1406596E+04 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .2697880E-07 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3111324E-03 180.000

MAGNESIUM OXIDE

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .5766256E+04
 = .1734228E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= -12.343
 = .000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .1033025E+08 0.
 = -.2260514E+07 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = .6428140E+04 -90.000
 = 0. 90.000
 = .1406623E+04 90.000
 = 0. 90.000
 = .1406584E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = .2697868E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = .3111320E-03 0.000
 = 0. 0.000

SINGLE CRYSTAL NICKEL

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .5276747E+04
 = .1894389E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12
 P4I 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .2349042E+08 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= .9693384E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = .5980193E+04 -90.000
 = 0. 90.000
 = .5980193E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= .3908623E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= .2063263E-03 0.000
 = 0. 0.000
 = 0. 0.000

SINGLE CRYSTAL NICKEL

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3610223E+04
 = .2769912E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1606549E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .8016356E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .3455326E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2494899E-03 0.000

ISOTROPIC NICKEL

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .5916080E+04
 = .1690309E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2632655E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .1026189E+05 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .4140991E+04 -90.000
 T23 = 0. 90.000
 T33 = .4140991E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3294344E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .1948960E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ISOTROPIC NICKEL

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3230821E+04
 = .3095189E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1437715E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .7583443E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .4081509E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2637324E-03 0.000

QUARTZ

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .5996013E+04
 = .1667775E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = 23.665
 P4I 13 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .7944717E+07 0.
 P2 = .3481726E+07 0.
 P3 = 0 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .5084210E+04 -90.000
 T12 = .2435094E+04 -90.000
 T13 = 0. 90.000
 T22 = .6350376E+03 -90.000
 T23 = 0. 90.000
 T33 = .8395546E+02 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .5336450E-07 -90.000
 S12 = .1277952E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .3199742E-03 0.000
 U2 = .1532524E-03 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

P4I = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = .1016303E-07 90.000

QUARTZ

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY	=	.4314379E+04	
INVERSE OF VELOCITY	=	.2317030E-03	
DELTA V/V	=	0.	
POWER FLOW	PHI 12	=	-25.807
ANGLES	PHI 13	=	.000
COMPLEX POWER	P1	=	.5716553E+07 0.
FLOW (RE IM)	P2	=	-.2764354E+07 0.
	P3	=	0. 0.
NORMALIZED	T11	=	.2065587E+04 90.000
STRESS	T12	=	.4312721E+04 -90.000
COMPONENTS	T13	=	0. 90.000
(MAG, PHASE)	T22	=	.4983196E+03 90.000
	T23	=	0. 90.000
	T33	=	.1858156E+04 90.000
NORMALIZED	S11	=	.4187560E-07 90.000
STRAIN	S12	=	.4371584E-07 -90.000
COMPONENTS	S13	=	0. 90.000
(MAG, PHASE)	S22	=	0. 90.000
	S23	=	0. 90.000
	S33	=	0. 90.000
NORMALIZED	U1	=	.1806672E-03 180.000
MECHANICAL	U2	=	.3772134E-03 0.000
DISPLACEMENT	U3	=	0. 0.000
(MAG, PHASE)			
ELECTRIC POTENTIAL	PHI	=	0. 0.000
(MAG, PHASE)			
NORMALIZED ELECTRIC	E1	=	0. 90.000
FIELD (MAG, PHASE)	E2	=	0. 90.000
	E3	=	0. 90.000
NORMALIZED ELECTRIC	D1	=	0. 90.000
DISPLACEMENT	D2	=	0. 90.000
(MAG, PHASE)	D3	=	.3611001E-03 -90.000

QUARTZ

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3913978E+04
 = .2554945E-03

DELTA V/V

= .9230E+00

POWER FLOW
 ANGLES

PHI 12 = -24.003
 PHI 13 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2725299E-12 0.
 P2 = -.1213558E-12 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .4554557E+04 90.000
 T21 = 0. 90.000
 T22 = .2028119E+04 -90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .5609634E-07 90.000
 S21 = 0. 90.000
 S22 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .4391196E-03 180.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = .1915547E+07 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = .4894119E+03 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = .1934209E-21 90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

QUARTZ

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .6354318E+04
 = .1573733E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = -.000
 PH 13 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .8419471E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .5803265E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T21 = .6454099E+03 -90.000
 T23 = 0. 90.000
 T33 = .6454099E+03 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .5423612E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .3446336E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = .1346063E-36 -90.000
 D3 = .1346063E-36 90.000

QUARTZ .2069E+02 .5133E+01

LAMBDA = 90.0000
MU = 90.0000
THETA = 90.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
INVERSE OF VELOCITY

= .4674297E+04
= .2139359E-03

DELTA V/V

= 0.

POWER FLOW
ANGLES

P4I 12 = -17.179
P4I 13 = -.060

COMPLEX POWER
FLOW (RE IM)

P1 = .6193444E+07 0.
P2 = -.1914726E+07 0.
P3 = 0. 0.

NORMALIZED
STRESS
COMPONENTS
(MAG, PHASE)

T11 = 0. 90.000
T12 = .4977326E+04 -90.000
T13 = 0. 90.000
T22 = .1538759E+04 90.000
T23 = 0. 90.000
T33 = .1538759E+04 -90.000

NORMALIZED
STRAIN
COMPONENTS
(MAG, PHASE)

S11 = 0. 90.000
S12 = .4298209E-07 -90.000
S13 = 0. 90.000
S22 = 0. 90.000
S23 = 0. 90.000
S33 = 0. 90.000

NORMALIZED
MECHANICAL
DISPLACEMENT
(MAG, PHASE)

U1 = 0. 0.000
U2 = .4018222E-03 0.000
U3 = 0. 0.000

ELECTRIC POTENTIAL
(MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
FIELD (MAG, PHASE)

E1 = 0. 90.000
E2 = 0. 90.000
E3 = 0. 90.000

NORMALIZED ELECTRIC
DISPLACEMENT
(MAG, PHASE)

D1 = 0. 90.000
D2 = 0. 90.000
D3 = .3490146E-08 -90.000

QUARTZ .2069E+02 .5133E+01

LAMBDA = 90.0000
MU = 90.0000
THETA = 90.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
INVERSE OF VELOCITY

= .4674297E+04
= .2139359E-03

DELTA V/V

= 0.

POWER FLOW
ANGLES

P4I 12 = 17.179
P4I 13 = .000

COMPLEX POWER
FLOW (RE IM)

P1 = .6193444E+07 0.
P2 = .1914726E+07 0.
P3 = 0. 0.

NORMALIZED
STRESS
COMPONENTS
(MAG, PHASE)

T11 = 0. 90.000
T12 = 0. 90.000
T13 = .4977326E+04 -90.000
T22 = 0. 90.000
T23 = .1538759E+04 -90.000
T33 = 0. 90.000

NORMALIZED
STRAIN
COMPONENTS
(MAG, PHASE)

S11 = 0. 90.000
S12 = 0. 90.000
S13 = .4298203E-07 -90.000
S22 = 0. 90.000
S23 = 0. 90.000
S33 = 0. 90.000

NORMALIZED
MECHANICAL
DISPLACEMENT
(MAG, PHASE)

U1 = 0. 0.000
U2 = 0. 0.000
U3 = .4018222E-03 0.000

ELECTRIC POTENTIAL
(MAG, PHASE)

P4I = 0. 0.000

NORMALIZED ELECTRIC
FIELD (MAG, PHASE)

E1 = 0. 90.000
E2 = 0. 90.000
E3 = 0. 90.000

NORMALIZED ELECTRIC
DISPLACEMENT
(MAG, PHASE)

D1 = 0. 90.000
D2 = .3490146E-06 90.000
D3 = 0. 90.000

QUARTZ

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .5744429E+04
 = .1740817E-03

DELTA V/V

= .4274E+00

POWER FLOW
 ANGLES

PH 12 = 0.000
 PH 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .3999841E-12 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .5517742E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .3946240E+03 -90.000
 T23 = .1140645E+04 90.000
 T33 = .7508768E+03 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .6309889E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .3624671E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PH = .1581170E+07 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = .2752528E+03 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = .3432634E-20 -90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

QUARTZ

LAMSDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .5099814E+04
 = .1960856E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .6757253E+07 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = .2725843E+04 90.000
 = .4427052E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = .1977499E-07 90.000
 = .3211665E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = .2016976E-03 190.000
 = .3275778E-03 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI

= 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1
 E2
 E3

= 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1
 D2
 D3

= 0. 90.000
 = .9370919E-08 -90.000
 = 0. 90.000

QUARTZ

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3298286E+04
 = .3031877E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P41 12

= 0.000

PHI 13

= 0.000

COMPLEX POWER
 FLOW (RE IM)

P1

= .4370230E+07

0.

P2

= 0.

0.

P3

= 0.

0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11

= 0.

90.000

T12

= .3560260E+04

-90.000

T13

= .2192138E+04

-90.000

T22

= 0.

90.000

T23

= 0.

90.000

T33

= 0.

90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11

= 0.

90.000

S12

= .6174888E-07

-90.000

S13

= .3802027E-07

-90.000

S22

= 0.

90.000

S23

= 0.

90.000

S33

= 0.

90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1

= 0.

0.000

U2

= .4073310E-03

0.000

U3

= .2508035E-03

0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI

= 0.

0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1

= 0.

90.000

E2

= 0.

90.000

E3

= 0.

90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1

= 0.

90.000

D2

= .1803087E-07

90.000

D3

= 0.

90.000

RUTILE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .7883497E+04
 = .1268473E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = -.000
 P4I 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1687068E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .8214788E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .4200042E+04 -90.000
 T23 = 0. 90.000
 T33 = .5342700E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3088266E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2434634E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

RUTILE

LAMBDA = 98.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .6645215E+04
 = .1504842E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = .000
 PHI 13 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1422075E+06 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .7542084E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 30.000
 S13 = .1995260E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2651787E-03 0.000

RUTILE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .5382561E+04
 = .1857852E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1151868E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .6787836E+04 -90.000
 T13 = 0. 90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .2737031E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .2946447E-03 0.000
 U3 = 0. 0.000

RUTILE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .1047917E+05
 = .2542737E-04

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PH 12 = .000
 PH 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2242543E+09 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .9471100E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .2740574E+04 -90.000
 T23 = 0. 90.000
 T33 = .2740574E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .2015129E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2111687E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

RUTILE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .5382561E+04
 = .1857852E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P41 12 = -.000
 P41 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1151858E+08 3.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6787836E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .2737031E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2946447E-03 0.000

RUTILE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .7883497E+04
 = .1268473E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = 0.000
 P4I 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1687068E+00 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .8214788E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .5342700E+04 -90.000
 T23 = 0. 90.000
 T33 = .4200042E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3088266E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2434634E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

RUTILE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .6645215E+04
 = .1504842E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1422075E+00 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .7542084E+04 -90.000
 T13 = 0. 90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .1995260E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .2651787E-03 0.000
 U3 = 0. 0.000

RUTILE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .5382561E+04
 = .1857852E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1151868E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6787836E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .2737031E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2946447E-03 0.000

SAPPHIRE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .1119237E+05
 = .9934662E-04

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PH 12 = 4.651
 PH 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2227281E+08 0.
 P2 = .1812139E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .9417799E+04 -90.000
 T12 = .6295127E+03 -90.000
 T13 = 0. 90.000
 T21 = .2096745E+04 -90.000
 T23 = 0. 90.000
 T31 = .3068221E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .1888959E-07 -90.000
 S12 = .6313172E-09 -90.000
 S13 = 0. 90.000
 S21 = 0. 90.000
 S23 = 0. 90.000
 S31 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2114192E-03 0.000
 U2 = .1413197E-04 0.000
 U3 = 0. 0.000

SAPPHIRE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .6467934E+04
 = .1546089E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P41 12 = -8.034
 P41 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1287119E+08 0.
 P2 = -.1816654E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .7175288E+04 -90.000
 T22 = 0. 90.000
 T23 = .1012729E+04 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .2154741E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2787345E-03 0.000

SAPPHIRE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .5044832E+04
 = .1654306E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHT 12 = -6.692
 PHT 13 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1202922E+08 0.
 P2 = -.1411472E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .4626320E+03 90.000
 T12 = .6921188E+04 -90.000
 T13 = 0. 90.000
 T22 = .3531076E+03 90.000
 T23 = 0. 90.000
 T33 = .1640108E+04 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3181150E-08 90.000
 S12 = .2379573E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .1922952E-04 190.000
 U2 = .2876824E-03 0.000
 U3 = 0. 0.000

SAPPHIRE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .1118596E+05
 = .8939781E-04

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = .000
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2226005E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .9436112E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .2103230E+04 -90.000
 T23 = 0. 90.000
 T33 = .2103230E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .1894802E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2119517E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

SAPPHIRE .5133E+01 .2069E+02

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .6177390E+04
 = .1645443E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= 9.163
 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .1209401E+08
 = .1933396E+07
 = 0.

0.
 0.
 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0.
 = 0.
 = .6955288E+04
 = 0.
 = .1111900E+04
 = 0.

90.000
 90.000
 -90.000
 90.000
 -90.000
 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0.
 = 0.
 = .2365744E-17
 = 0.
 = 0.
 = 0.

90.000
 90.000
 -90.000
 90.000
 90.000
 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0.
 = 0.
 = .2675510E-03

0.000
 0.000
 0.000

SAPP4IRE .5133E+01 .2069E+02

LAMBDA = 90.0000
 MU = 90.00 0
 THETA = 90.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .6177390E+04
 = .1645443E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= -9.783
 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .1209401E+06 J.
 = -.1933396E+07 0.
 = 0. J.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = .6955268E+04 -90.000
 = 0. 90.000
 = .1111900E+04 90.000
 = 0. 90.000
 = .1111900E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = .2365744E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. J.000
 = .2675510E-03 0.000
 = 0. J.000

SAPPHIRE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .1117472E+05
 = .8948770E-04

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PH 12 = 0.000
 PH 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2223769E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .9431372E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .3112163E+04 -90.000
 T23 = .4459502E+03 90.000
 T33 = .2106403E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .1897660E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2120582E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

SAPPHIRE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .5765868E+04
 = .1478007E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PH 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .1346408E+08 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = .6103077E+04 -90.000
 = .4075385E+04 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0 90.000
 = .1674899E-07 -90.000
 = .1118429E-07 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = .2266430E-03 0.000
 = .1513429E-03 190.000

SAPPHIRE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .5743855E+04
 = .1740991E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P41 12 = 0.000
 P41 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1143027E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .3754989E+04 -90.000
 T13 = .5623269E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .1429844E-07 -90.000
 S13 = .2141257E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .1642563E-03 0.000
 U3 = .2459814E-03 0.000

SILICON

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .8440654E+04
 = .1184742E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = 0.000
 P4I 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .9833362E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .6271638E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .2414203E+04 -90.000
 T23 = 0. 90.000
 T33 = .2414203E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3778095E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .3188959E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

SILICON

LAMBOA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .5844920E+04
 = .1710887E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .6809332E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .5218939E+04 -90.000
 T21 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .3278228E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3832196E-03 0.000

SILICON

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .9137716E+04
 = .1094365E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12
 P4I 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IN)

P1
 P2
 P3

= .1064544E+08 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= .6525470E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = .1185687E+04 -90.000
 = 0. 90.000
 = .2143292E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= .3354135E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= .3064913E-03 0.000
 = 0. 0.000
 = 0. 0.000

SILICON

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .5844920E+04
 = .1710827E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12
 P4I 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .6809332E+07 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = 0. 90.000
 = .5218939E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = 0. 90.000
 = .3278228E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = 0. 0.000
 = .3832196E-03 0.000

SILICON

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .4680798E+04
 = .2136388E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= .000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .5453130E+07 0.
 = 0. 0.
 = 0 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = .4670387E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = .4574327E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = .4282300E-03 0.000
 = 0. 0.000

SILICON

LAMBOA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .3358539E+04
 = .1068543E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4 12 = .000
 PHI 13 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1090270E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .6603847E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .1451945E+04 -90.000
 T23 = 0. 90.000
 T33 = .1451935E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3236122E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .3028538E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

SILICON

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .5098451E+04
 = .1961380E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= 12.528
 = .000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .5939695E+07 0.
 = .1319865E+07 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = 0. 90.000
 = .4874298E+04 90.000
 = 0. 90.000
 = .1083122E+04 90.000
 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = 0. 90.000
 = .4023923E-07 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = 0. 0.000
 = .4103155E-03 180.000

SILICON

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .5098466E+04
 = .1961374E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = -12.529
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .5939713E+07 0.
 P2 = -.1319905E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .4874303E+04 -90.000
 T13 = 0. 90.000
 T22 = .1083145E+04 90.000
 T23 = 0 90.000
 T33 = .1083111E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .4023905E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .4103149E-03 0.000
 U3 = 0. 0.000

SINGLE CRYSTAL SILVER

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .3408672E+04
 = .2933693E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1789553E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .8460622E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .6380141E+04 -90.000
 T23 = 0. 90.000
 T33 = .6380141E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .6934936E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2363892E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

SINGLE CRYSTAL SILVER

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2060975E+04
 = .4852072E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PH' 12 = 0.000
 PH' 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1082012E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6578790E+04 -90.000
 T21 = 0. 90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T31 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .7375325E-07 -90.000
 S21 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S31 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3040073E-03 0.000

ISOTROPIC SILVER

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .3813510E+04
 = .2622256E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2002093E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .8948950E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .5092755E+04 -90.000
 T23 = 0. 90.000
 T33 = .5092755E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .5860478E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2234899E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ISOTROPIC SILVER

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1770122E+04
 = .5649327E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P41 12 = 0.000
 P41 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .9293143E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6096931E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .9265853E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3280339E-03 0.000

POLYCRYSTALLINE SILVER

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .7696846E+04
 = .2705009E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4T 12 = 0.000
 PH 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1940844E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .8811002E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .5086435E+04 -90.000
 T23 = 0. 90.000
 T33 = .5086435E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .6140071E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2269889E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

POLYCRYSTALLINE SILVER

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .1698739E+04
 = .5886719E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .8918380E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .5972731E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .9855992E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3348552E-03 0.000

MAGNESIUM ALUMINATE SPINEL

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY	=	.9826732E+04	
INVERSE OF VELOCITY	=	.1132922E-03	
DELTA V/V	=	0.	
POWER FLOW	PHT 12	=	0.000
ANGLES	PHT 13	=	0.000
COMPLEX POWER	P1	=	.1580426E+08 0.
FLOW (RE IM)	P2	=	0. 0.
	P3	=	0. 0.
NORMALIZED	T11	=	.7950915E+04 -90.000
STRESS	T12	=	0. 90.000
COMPONENTS	T13	=	0. 90.000
(MAG, PHASE)	T22	=	.4360179E+04 -90.000
	T23	=	0. 90.000
	T33	=	.4360179E+04 -90.000
NORMALIZED	S11	=	.2849790E-07 -90.000
STRAIN	S12	=	0. 90.000
COMPONENTS	S13	=	0. 90.000
(MAG, PHASE)	S22	=	0. 90.000
	S23	=	0. 90.000
	S33	=	0. 90.000
NORMALIZED	U1	=	.2515434E-03 0.000
MECHANICAL	U2	=	0. 0.000
DISPLACEMENT	U3	=	0. 0.000
(MAG, PHASE)			

MAGNESIUM ALUMINATE SPINEL

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .5536474E+04
 = .1529877E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PH 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1170355E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6842092E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .2235978E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2923082E-03 0.000

MAGNESIUM ALUMINATE SPINEL

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .1015105E+05
 = .9851196E-04

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1817546E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .8526537E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .1455750E+04 -90.000
 T23 = 0. 90.000
 T33 = .3535393E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .2310715E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2345618E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

MAGNESIUM ALUMINATE SPINEL

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .6536474E+04
 = .1529877E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1170356E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6842092E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .2235978E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2923092E-03 0.000

MAGNESIUM ALUMINATE SPINEL

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .4194383E+04
 = .2384141E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P47 12 = 0.000
 P47 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .7510043E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .5480892E+04 -90.000
 T13 = 0. 90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .4349914E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .3649041E-03 0.000
 U3 = 0. 0.000

MAGNESIUM ALUMINATE SPINEL

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .1055563E+05
 = .9473615E-04

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P41 12 = .000
 P41 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1889986E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .8694794E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .2026615E+04 -90.000
 T23 = 0. 90.000
 T33 = .2026596E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .2179146E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2300227E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

MAGNESIUM ALUMINATE SPINEL

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .5096132E+04
 = .1962273E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P41 12
 PHI 13

= -24.523
 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .9124624E+07 0.
 P2 = -.4162718E+07 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .6041399E+04 -90.000
 T13 = 0. 90.000
 T22 = .2756112E+04 90.000
 T23 = 0. 90.000
 T33 = .2756027E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .3248044E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .3310492E-03 0.000
 U3 = 0. 0.000

MAGNESIUM ALUMINATE SPINEL

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .5096100E+04
 = .1962285E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= 24.522
 = .000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .9124568E+07
 = .4162615E+07
 = 0.

0.
 0.
 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0.
 = 0.
 = .6041380E+04
 = 0.
 = .2756069E+04
 = 0.

90.000
 90.000
 90.000
 90.000
 90.000
 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0.
 = 0.
 = .3248074E-07
 = 0.
 = 0.
 = 0.

90.000
 90.000
 90.000
 90.000
 90.000
 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0.
 = 0.
 = .3310502E-03

0.000
 0.000
 180.000

TELLURIUM DIOXIDE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUOINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .3049399E+04
 = .3279335E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= .000
 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .9132949E+07 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= .6044154E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = .2365575E+04 -90.000
 = 0. 90.000
 = .5555847E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= .1085126E-06 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= .3308983E-07 0.000
 = 0. 0.000
 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PH

= 0. 0.000

NORMALIZED ELECTRIC
 FIFLD (MAG, PHASE)

E1
 E2
 E3

= 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1
 D2
 D3

= 0. 90.000
 = 0. 90.000
 = 0. 90.000

TELLURIUM DIOXIDE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3316876E+04
 = .3014885E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P41 12 = -.000
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .9934045E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6307664E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .4782750E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3172758E-03 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

TELLURIUM DIOXIDE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2103340E+04
 = .4754343E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P1 12 = 0.000
 P1 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .6299504E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .5019763E+04 -90.000
 T13 = 0. 0.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .9471250E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .3984252E-03 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = .4091500E-07 -90.000

TELLURIUM DIOXIDE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .4202710E+04
 = .2379417E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = .000
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1258712E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .7095665E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .1462055E+04 -90.000
 T23 = 0. 90.000
 T33 = .1462056E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .6706678E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2818622E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PH = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = .5884223E-36 90.000
 D3 = .5884223E-36 -90.000

TELLURIUM DIOXIDE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2103340E+04
 = .4754343E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = -.000
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .6299504E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .5019763E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .9471250E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3984252E-03 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PH = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = .4091580E-07 -90.000
 D3 = 0. 90.000

TELLURIUM DIOXIDE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .3316876E+04
 = .3014885E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .9934045E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .6303664E+04 -90.000
 T13 = 0. 90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .4782750E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .3172759E-03 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

TELLURIUM DIOXIDE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3049399E+04
 = .3279335E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P41 12 = 0.000
 P41 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .9132949E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .6044154E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .5555847E+04 -90.000
 T23 = 0. 90.000
 T33 = .2365575E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .1085126E-06 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .3308993E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

P41 = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

TELLURIUM DIOXIDE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY	=	.2103340E+04	
INVERSE OF VELOCITY	=	.4754343E-03	
DELTA V/V	=	0.	
POWER FLOW	P4I 12	=	0.000
ANGLES	P4I 13	=	0.000
COMPLEX POWER	P1	=	.6299504E+07 0.
FLOW (RE IM)	P2	=	0. 0.
	P3	=	0. 0.
NORMALIZED	T11	=	0. 90.000
STRESS	T12	=	0. 90.000
COMPONENTS	T13	=	.5019763E+04 -90.000
(MAG, PHASE)	T22	=	0. 90.000
	T23	=	0. 90.000
	T33	=	0. 90.000
NORMALIZED	S11	=	0. 90.000
STRAIN	S12	=	0. 90.000
COMPONENTS	S13	=	.9471250E-07 -90.000
(MAG, PHASE)	S22	=	0. 90.000
	S23	=	0. 90.000
	S33	=	0. 90.000
NORMALIZED	U1	=	0. 0.000
MECHANICAL	U2	=	0. 0.000
DISPLACEMENT	U3	=	.3984252E-03 0.000
(MAG, PHASE)			
ELECTRIC POTENTIAL	P4I	=	0. 0.000
(MAG, PHASE)			
NORMALIZED ELECTRIC	E1	=	0. 90.000
FIELD (MAG, PHASE)	E2	=	0. 90.000
	E3	=	0. 90.000
NORMALIZED ELECTRIC	D1	=	0. 90.000
DISPLACEMENT	D2	=	.4091590E-07 90.000
(MAG, PHASE)	D3	=	0. 90.000

TELLURIUM DIOXIDE

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .4463729E+04
 = .2240279E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1336887E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .7312692E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .7628238E+03 90.000
 T23 = 0. 90.000
 T33 = .1335708E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .6127099E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2734971E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

TELLURIUM DIOXIDE

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2103340E+04
 = .4754343E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .6299504E+07 3.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .5019763E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .9471250E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3984252E-03 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PH = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = .4091580E-07 90.000
 D3 = 0. 90.000

TELLURIUM DIOXIDE

LAMBOA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY	=	.6128834E+03	
INVERSE OF VELOCITY	=	.1631632E-02	
DELTA V/V	=	0.	
POWER FLOW	P4T 12	=	.000
ANGLES	PHI 13	=	0.000
COMPLEX POWER	P1	=	.1835586E+07 0.
FLOW (RE IM)	P2	=	0. 0.
	P3	=	0. 0.
NORMALIZED	T11	=	0. 90.000
STRESS	T12	=	.2709675E+04 -90.000
COMPONENTS	T13	=	0. 90.000
(MAG, PHASE)	T22	=	0. 90.000
	T23	=	0. 90.000
	T32	=	0. 90.000
	T33	=	0. 90.000
NORMALIZED	S11	=	0. 90.000
STRAIN	S12	=	.6021502E-06 -90.000
COMPONENTS	S13	=	0. 90.000
(MAG, PHASE)	S22	=	0. 90.000
	S23	=	0. 90.000
	S32	=	0. 90.000
	S33	=	0. 90.000
NORMALIZED	U1	=	0. 0.000
MECHANICAL	U2	=	.7380957E-03 0.000
DISPLACEMENT	U3	=	0. 0.000
(MAG, PHASE)			
ELECTRIC POTENTIAL	PHI	=	0. 0.000
(MAG, PHASE)			
NORMALIZED ELECTRIC	E1	=	0. 90.000
FIELD (MAG, PHASE)	E2	=	0. 90.000
	E3	=	0. 90.000
NORMALIZED ELECTRIC	D1	=	0. 90.000
DISPLACEMENT	D2	=	0. 90.000
(MAG, PHASE)	D3	=	0. 90.000

YTTRIUM ALUMINUM GARNET

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .8567765E+04
 = .1167166E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P41 12 = 0.000
 P41 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1949165E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .8829873E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .2934479E+04 -90.000
 T23 = 0. 90.000
 T33 = .2934479E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .2643675E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2265038E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

YTTRIUM ALUMINUM GARNET

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY	=	.5027397E+04	
INVERSE OF VELOCITY	=	.1989101E-03	
DELTA V/V	=	0.	
POWER FLOW	P4I 12	=	0.000
ANGLES	P4I 13	=	0.000
COMPLEX POWER	P1	=	.1143733E+08 0.
FLOW (RE IM)	P2	=	0. 0.
	P3	=	0. 0.
NORMALIZED	T11	=	0. 90.000
STRESS	T12	=	0. 90.000
COMPONENTS	T13	=	.6763824E+04 -90.000
(MAG, PHASE)	T22	=	0. 90.000
	T23	=	0. 90.000
	T33	=	0. 90.000
NORMALIZED	S11	=	0. 90.000
STRAIN	S12	=	0. 90.000
COMPONENTS	S13	=	.2940793E-07 -90.000
(MAG, PHASE)	S22	=	0. 90.000
	S23	=	0. 90.000
	S33	=	0. 90.000
NORMALIZED	U1	=	0. 0.000
MECHANICAL	U2	=	0. 0.000
DISPLACEMENT	U3	=	.2956907E-03 0.000
(MAG, PHASE)			

YTTRIUM ALUMINUM GARNET

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.8000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .8612539E+04
 = .1161098E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .1959353E+08 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= .8852915E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = .2819817E+04 -90.000
 = 0. 90.000
 = .2911625E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= .2623086E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= .2259143E-03 0.000
 = 0. 0.000
 = 0. 0.000

YTTRIUM ALUMINUM GARNET

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .5027397E+04
 = .1989101E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1143733E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6763824E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .2940793E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2956907E-03 0.000

YTTRIUM ALUMINUM GARNET

LAMBDA = 45.0000
 NU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .4950302E+04
 = .2020079E-03

DELTA ν/ν

= 0.

POWER FLOW
 ANGLES

P4I 12
 P4I 13

= .000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .1126194E+08 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0 90.000
 = .6711762E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = .3009759E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = .2979843E-03 0.000
 = 0. 0.000

YTTRIUM ALUMINUM GARNET

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

LONGITUDINAL VELOCITY = .8627412E+04
 INVERSE OF VELOCITY = .1159096E-03

DELTA V/V = 0.

POWER FLOW P4T 12 = .000
 ANGLES PHI 13 = -.000

COMPLEX POWER P1 = .1962736E+08 0.
 FLOW (RE IM) P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED T11 = .8860556E+04 -90.000
 STRESS T12 = 0. 90.000
 COMPONENTS T13 = 0. 90.000
 (MAG, PHASE) T22 = .2843053E+04 -90.000
 T23 = 0. 90.000
 T33 = .2843052E+04 -90.000

NORMALIZED S11 = .2616306E-07 -90.000
 STRAIN S12 = 0. 90.000
 COMPONENTS S13 = 0. 90.000
 (MAG, PHASE) S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED U1 = .2257195E-03 0.000
 MECHANICAL U2 = 0. 0.000
 DISPLACEMENT U3 = 0. 0.000
 (MAG, PHASE)

YTTRIUM ALUMINUM GARNET

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .4976134E+04
 = .2009592E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12
 P4I 13

= -.839
 = .000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .1132070E+08 0.
 = -.1657853E+06 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = .6729251E+04 -90.000
 = 0. 90.000
 = .9854606E+02 90.000
 = 0. 90.000
 = .9854416E+02 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = .2986353E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = .2972093E-03 0.000
 = 0. 0.000

YTTRIUM ALUMINUM GARNET

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .4976133E+04
 = .2009593E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = .839
 P4I 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1132070E+08 0.
 P2 = .1657821E+06 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6729250E+04 -90.000
 T22 = 0. 90.000
 T23 = .9854419E+02 -90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .2986354E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2972099E-03 0.000

YTTRIUM GALLIUM GARNET

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .7080831E+04
 = .1412264E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2049901E+03 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .9055165E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .3658873E+04 -90.000
 T23 = 0. 90.000
 T33 = .3658873E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3119244E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2208684E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

YTTRIUM GALLIUM GARNET

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY	=	.4061275E+04	
INVERSE OF VELOCITY	=	.2462281E-03	
DELTA V/V	=	0.	
POWER FLOW	P4 12	=	0.000
ANGLES	P4E 13	=	0.000
COMPLEX POWER	P1	=	.1175739E+08 0.
FLOW (RE IM)	P2	=	0. 0.
	P3	=	0. 0.
NORMALIZED	T11	=	0. 90.000
STRESS	T12	=	0. 90.000
COMPONENTS	T13	=	.6857811E+04 -90.000
(MAG, PHASE)	T22	=	0. 90.000
	T23	=	0. 90.000
	T33	=	0. 90.000
NORMALIZED	S11	=	0. 90.000
STRAIN	S12	=	0. 90.000
COMPONENTS	S13	=	.3590477E-07 -90.000
(MAG, PHASE)	S22	=	0. 90.000
	S23	=	0. 90.000
	S33	=	0. 90.000
NORMALIZED	U1	=	0. 0.000
MECHANICAL	U2	=	0. 0.000
DISPLACEMENT	U3	=	.2916383E-03 0.000
(MAG, PHASE)			

YTTRIUM GALLIUM GARNET

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .7189755E+04
 = .1390868E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PH 12 = 0.000
 PH 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .2081434E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .9124547E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .3301665E+04 -90.000
 T23 = 0. 90.000
 T33 = .3576042E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3048629E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2191890E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

YTTRIUM GALLIUM GARNET

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .4061275E+04
 = .2462281E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .1175739E+08 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = 0. 90.000
 = .6857811E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = 0. 90.000
 = .3590477E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = 0. 0.000
 = .2916343E-03 0.000

YTTRIUM GALLIUM GARNET

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3865172E+04
 = .2587207E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = .000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1118967E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .6690193E+04 -90.000
 T13 = 0. 90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .3867164E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .2989450E-03 0.000
 U3 = 0. 0.000

YTTRIUM GALLIUM GARNET

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .7225698E+04
 = .1383949E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= .000
 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .2091840E+08 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= .9147326E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = .3367840E+04 -90.000
 = 0. 90.000
 = .3367836E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= .3025911E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= .2186431E-03 0.000
 = 0. 0.000
 = 0. 0.000

YTTRIUM GALLIUM GARNET

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3931625E+04
 = .2543478E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = 2.714
 P4I 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1138205E+08 0.
 P2 = .5395505E+06 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6747460E+04 -90.000
 T22 = 0. 90.000
 T23 = .3198540E+03 -90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .3769533E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .2964078E-03 0.000

YTTRIUM GALLIUM GARNET

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3931628E+04
 = .2543476E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= -2.714
 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .1138206E+08 0.
 = -.5395605E+06 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = .6747462E+04 -90.000
 = 0. 90.000
 = .3198598E+03 90.000
 = 0. 90.000
 = .3198537E+03 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = .3769530E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = .2964077E-03 0.000
 = 0. 0.000

YTTRIUM IRON GARNET

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY
 INVERSE OF VELOCITY

= .7213248E+04
 = .1386338E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4 12
 PHI 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .1864625E+08 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= .8636260E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = .3467346E+04 -90.000
 = 0. 90.000
 = .3467346E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= .3210506E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= .2315817E-03 0.000
 = 0. 0.000
 = 0. 0.000

YTTRIUM IRON GARNET

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3844160E+04
 = .2601349E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .9937153E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6304650E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .4126080E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3172262E-03 0.000

YTTRIUM IRON GARNET

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .7158066E+04
 = .1397025E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1850360E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .8603162E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .3640674E+04 -90.000
 T23 = 0. 90.000
 T33 = .3507518E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3247702E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2324727E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

YTTRIUM IRON GARNET

LAMBDA = 45.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3945960E+04
 = .2534238E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = .000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1020031E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .6387584E+04 -90.000
 T13 = 0. 90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .3967443E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .3131074E-03 0.000
 U3 = 0. 0.000

YTTRIUM IRON GARNET

LAMBDA = 45.0000
 ML = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3844160E+04
 = .2601349E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .9937153E+07 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = 0. 90.000
 = .6304650E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = 0. 90.000
 = .4126080E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = 0. 0.000
 = .3172262E-03 0.000

YTTRIUM IRON GARNET

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .7139577E+04
 = .1400643E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = -.000
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1845581E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .8592045E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .3610265E+04 -90.000
 T23 = 0. 90.000
 T33 = .3610268E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3260326E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2327735E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

YTTRIUM IRON GARNET

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3912321E+04
 = .2556027E-03

DELTA //V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 1.399
 PHI 13 = .000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1011334E+08 0.
 P2 = .2470127E+06 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = .6360297E+04 -90.000
 T13 = 0. 90.000
 T22 = .1553467E+03 -90.000
 T23 = 0. 90.000
 T33 = .1553437E+03 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = .4018723E-07 -90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = .3144507E-03 0.000
 U3 = 0. 0.000

YTTRIUM IRON GARNET

LAMBDA = 45.0000
 MU = 90.0000
 THETA = 35.2640

REGULAR CONSTANTS .

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .3912320E+04
 = .2556028E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = -1.399
 PHI 13 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1011335E+08 0.
 P2 = -.2470081E+06 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .6360300E+04 -90.000
 T22 = 0. 90.000
 T23 = .1553437E+03 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .4018722E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3144506E-03 0.000

AD-A090 947

ROME AIR DEVELOPMENT CENTER GRIFFISS AFB NY
MICROWAVE ACOUSTICS HANDBOOK. VOLUME 3. BULK WAVE VELOCITIES.(U)

F/G 20/1

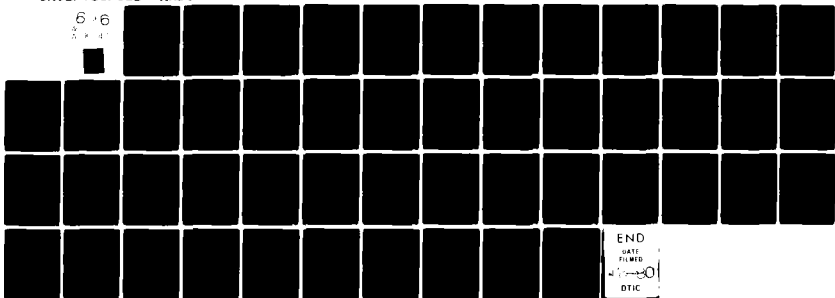
MAY 80 A J SLOBODNIK, R T DELMONICO

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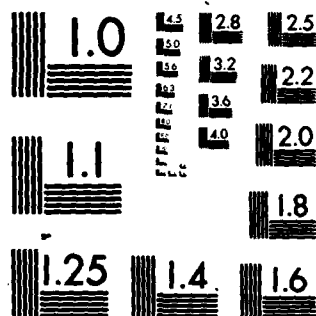


END

GATE

FLAMES

DTIC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

ZINC OXIDE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .5080447E+04
 = .1644616E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = .000
 PHI 13 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1726847E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .8311069E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .4155535E+04 -90.000
 T23 = 0. 90.000
 T33 = .4788759E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3957652E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2406429E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PH = 0. 0.000

ZINC OXIDE

LAMBDA = 98.0000
 MU = 98.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2683391E+04
 = .3468139E-03

DELTA V/V

= .5133E+01

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .1277770E-12 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = .5723227E+04 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = .6059761E-07 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = .3494532E-03 180.000
 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI

= .2797522E+07 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1
 E2
 E3

= .9702196E+03 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1
 D2
 D3

= .2824776E-21 90.000
 = 0. 90.000
 = 0. 90.000

ZINC OXIDE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2799019E+04
 = .3572680E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

P4I 12 = 0.000
 PH 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .7949214E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .5638870E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .6335809E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3546810E-03 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PH = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

ZINC OXIDE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

LONGITUDINAL VELOCITY	=	.6330383E+04	
INVERSE OF VELOCITY	=	.1579683E-03	
DELTA V/V	=	.3720E+01	
POWER FLOW	PHI 12	=	.000
ANGLES	PHI 13	=	.000
COMPLEX POWER	P1	=	.8459645E-13 0.
FLOW (RE IM)	P2	=	0. 0.
	P3	=	0. 0.
NORMALIZED	T11	=	.8480162E+04 -90.000
STRESS	T12	=	0. 90.000
COMPONENTS	T13	=	0. 90.000
(MAG, PHASE)	T22	=	.3580574E+04 -90.000
	T23	=	0. 90.000
	T33	=	.3580574E+04 -90.000
NORMALIZED	S11	=	.3725596E-07 -90.000
STRAIN	S12	=	0. 90.000
COMPONENTS	S13	=	0. 90.000
(MAG, PHASE)	S22	=	0. 90.000
	S23	=	0. 90.000
	S33	=	0. 90.000
NORMALIZED	U1	=	.2358445E-03 0.000
MECHANICAL	U2	=	0. 0.000
DISPLACEMENT	U3	=	0. 0.000
(MAG, PHASE)			
ELECTRIC POTENTIAL	PHI	=	.3438143E+07 0.000
(MAG, PHASE)			
NORMALIZED ELECTRIC	E1	=	.5431176E+03 90.000
FIELD (MAG, PHASE)	E2	=	0. 90.000
	E3	=	0. 90.000
NORMALIZED ELECTRIC	D1	=	.5207455E-21 90.000
DISPLACEMENT	D2	=	0. 90.000
(MAG, PHASE)	D3	=	0. 90.000

ZINC OXIDE

LAMBDA = 90.0000
 MU = 90.0000
 THETA = 90.0000

REGULAR CONSTANTS

SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2735397E+04
 = .3655777E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = -.000
 PHI 13 = -.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .7768526E+07 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .5574415E+04 -90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .6558136E-07 -90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3587820E-03 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = .7738600E-07 90.000

ZINC OXIDE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

LONGITUDINAL WAVE VELOCITY
 INVERSE OF VELOCITY

= .6080447E+04
 = .1644616E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1726847E+08 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = .8311069E+04 -90.000
 T12 = 0. 90.000
 T13 = 0. 90.000
 T22 = .4788759E+04 -90.000
 T23 = 0. 90.000
 T33 = .4155535E+04 -90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = .3957652E-07 -90.000
 S12 = 0. 90.000
 S13 = 0. 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = .2406429E-03 0.000
 U2 = 0. 0.000
 U3 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = 0. 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = 0. 90.000
 D2 = 0. 90.000
 D3 = .2414168E-07 90.000

ZINC OXIDE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

FIRST SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2883391E+04
 = .3468139E-03

DELTA V/V

= .5133E+01

POWER FLOW
 ANGLES

PHI 12 = 0.000
 PHI 13 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1 = .1277770E-12 0.
 P2 = 0. 0.
 P3 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11 = 0. 90.000
 T12 = 0. 90.000
 T13 = .5723227E+04 90.000
 T22 = 0. 90.000
 T23 = 0. 90.000
 T33 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11 = 0. 90.000
 S12 = 0. 90.000
 S13 = .6059761E-07 90.000
 S22 = 0. 90.000
 S23 = 0. 90.000
 S33 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1 = 0. 0.000
 U2 = 0. 0.000
 U3 = .3494532E-03 180.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI = .2797522E+07 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1 = .9702195E+03 90.000
 E2 = 0. 90.000
 E3 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1 = .2824776E-21 90.000
 D2 = 0. 90.000
 D3 = 0. 90.000

ZINC OXIDE

LAMBDA = 0.0000
 MU = 0.0000
 THETA = 0.0000

REGULAR CONSTANTS

SECOND SHEAR WAVE VELOCITY
 INVERSE OF VELOCITY

= .2799019E+04
 = .3572680E-03

DELTA V/V

= 0.

POWER FLOW
 ANGLES

PHI 12
 PHI 13

= 0.000
 = 0.000

COMPLEX POWER
 FLOW (RE IM)

P1
 P2
 P3

= .7949214E+07 0.
 = 0. 0.
 = 0. 0.

NORMALIZED
 STRESS
 COMPONENTS
 (MAG, PHASE)

T11
 T12
 T13
 T22
 T23
 T33

= 0. 90.000
 = .5638870E+04 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 STRAIN
 COMPONENTS
 (MAG, PHASE)

S11
 S12
 S13
 S22
 S23
 S33

= 0. 90.000
 = .6335809E-07 -90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED
 MECHANICAL
 DISPLACEMENT
 (MAG, PHASE)

U1
 U2
 U3

= 0. 0.000
 = .3546810E-03 0.000
 = 0. 0.000

ELECTRIC POTENTIAL
 (MAG, PHASE)

PHI

= 0. 0.000

NORMALIZED ELECTRIC
 FIELD (MAG, PHASE)

E1
 E2
 E3

= 0. 90.000
 = 0. 90.000
 = 0. 90.000

NORMALIZED ELECTRIC
 DISPLACEMENT
 (MAG, PHASE)

D1
 D2
 D3

= 0. 90.000
 = 0. 90.000
 = 0. 90.000

5. MATERIAL CONSTANTS

The material constants¹³ used for the computations in this report are listed in this section.

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13. Slobodnik, A. J., Jr., Conway, E. D., and Delmonico, R. T. (1973) Micro-wave Acoustics Handbook, Volume 1A, Surface Wave Velocities, TR-73-0597, AD 780172, National Technical Information Services, Springfield, Virginia 22151.

$c_{11} = 1.113$	$c_{12} = 0.591$	$c_{13} = 0.591$	$c_{14} = 0$	$c_{15} = 0$	$c_{16} = 0$
$c_{21} = 0.591$	$c_{22} = 1.113$	$c_{23} = 0.591$	$c_{24} = 0$	$c_{25} = 0$	$c_{26} = 0$
$c_{31} = 0.591$	$c_{32} = 0.591$	$c_{33} = 1.113$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$
$c_{41} = 0$	$c_{42} = 0$	$c_{43} = 0$	$c_{44} = 0.261$	$c_{45} = 0$	$c_{46} = 0$
$c_{51} = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 0.261$	$c_{56} = 0$
$c_{61} = 0$	$c_{62} = 0$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = 0$	$c_{66} = 0.261$

$$\rho = 2.70 \times 10^3 \text{ kg/m}^3$$

Elastic Constants (in 10^{11} N/m^2)

Material: Aluminum

Crystal Group: Isotropic

References: (Anderson, 65)

$\epsilon_{11}^E = 2.39$	$\epsilon_{12} = 1.04$	$\epsilon_{13} = 0.50$	$\epsilon_{14} = 0$	$\epsilon_{15} = 0$	$\epsilon_{16} = 0$	$\epsilon_{11}^S = 0$	$\epsilon_{21} = 0$	$\epsilon_{31} = -0.4$
$\epsilon_{21} = 1.04$	$\epsilon_{22} = 2.47$	$\epsilon_{23} = 0.52$	$\epsilon_{24} = 0$	$\epsilon_{25} = 0$	$\epsilon_{26} = 0$	$\epsilon_{12} = 0$	$\epsilon_{22} = 0$	$\epsilon_{32} = -0.3$
$\epsilon_{31} = 0.50$	$\epsilon_{32} = 0.52$	$\epsilon_{33} = 1.35$	$\epsilon_{34} = 0$	$\epsilon_{35} = 0$	$\epsilon_{36} = 0$	$\epsilon_{13} = 0$	$\epsilon_{23} = 0$	$\epsilon_{33} = 4.3$
$\epsilon_{41} = 0$	$\epsilon_{42} = 0$	$\epsilon_{43} = 0$	$\epsilon_{44} = 0.65$	$\epsilon_{45} = 0$	$\epsilon_{46} = 0$	$\epsilon_{14} = 0$	$\epsilon_{24} = 3.4$	$\epsilon_{34} = 0$
$\epsilon_{51} = 0$	$\epsilon_{52} = 0$	$\epsilon_{53} = 0$	$\epsilon_{54} = 0$	$\epsilon_{55} = 0.66$	$\epsilon_{56} = 0$	$\epsilon_{15} = 2.8$	$\epsilon_{25} = 0$	$\epsilon_{35} = 0$
$\epsilon_{61} = 0$	$\epsilon_{62} = 0$	$\epsilon_{63} = 0$	$\epsilon_{64} = 0$	$\epsilon_{65} = 0$	$\epsilon_{66} = 0.76$	$\epsilon_{16} = 0$	$\epsilon_{26} = 0$	$\epsilon_{36} = 0$
$\epsilon_{11}^S = 0$	$\epsilon_{12}^S = 0$	$\epsilon_{13}^S = 0$	$\epsilon_{14}^S = 0$	$\epsilon_{15}^S = 2.8$	$\epsilon_{16}^S = 0$	$\epsilon_{11}^S = 196.0$	$\epsilon_{12}^S = 0$	$\epsilon_{13}^S = 0$
$\epsilon_{21}^S = 0$	$\epsilon_{22}^S = 0$	$\epsilon_{23}^S = 0$	$\epsilon_{24}^S = 3.4$	$\epsilon_{25}^S = 0$	$\epsilon_{26}^S = 0$	$\epsilon_{21}^S = 0$	$\epsilon_{22}^S = 201.0$	$\epsilon_{23}^S = 0$
$\epsilon_{31}^S = -0.4$	$\epsilon_{32}^S = -0.3$	$\epsilon_{33}^S = 4.3$	$\epsilon_{34}^S = 0$	$\epsilon_{35}^S = 0$	$\epsilon_{36}^S = 0$	$\epsilon_{31}^S = 0$	$\epsilon_{32}^S = 0$	$\epsilon_{33}^S = 28.0$

$$\rho = 5.30 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material: $\text{Be}_2\text{Nb}_5\text{O}_{15}$

Crystal Group: 2mm

References: (Warner, Coquin and Fink, 69)

$c_{11}^E = 1.28$	$c_{12} = 0.305$	$c_{13} = 0.305$	$c_{14} = 0$	$c_{15} = 0$	$c_{16} = 0$	$e_{11} = 0$	$e_{21} = 0$	$e_{31} = 0$
$c_{21} = 0.305$	$c_{22} = 1.28$	$c_{23} = 0.305$	$c_{24} = 0$	$c_{25} = 0$	$c_{26} = 0$	$e_{12} = 0$	$e_{22} = 0$	$e_{32} = 0$
$c_{31} = 0.305$	$c_{32} = 0.305$	$c_{33} = 1.28$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$	$e_{13} = 0$	$e_{23} = 0$	$e_{33} = 0$
$c_{41} = 0$	$c_{42} = 0$	$c_{43} = 0$	$c_{44} = 0.255$	$c_{45} = 0$	$c_{46} = 0$	$e_{14} = 0.99$	$e_{24} = 0$	$e_{34} = 0$
$c_{51} = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 0.255$	$c_{56} = 0$	$e_{15} = 0$	$e_{25} = 0.99$	$e_{35} = 0$
$c_{61} = 0$	$c_{62} = 0$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = 0$	$c_{66} = 0.255$	$e_{16} = 0$	$e_{26} = 0$	$e_{36} = 0.99$
$e_{11} = 0$	$e_{12} = 0$	$e_{13} = 0$	$e_{14} = 0.99$	$e_{15} = 0$	$e_{16} = 0$	$S_{11} = 34.2$	$\epsilon_{12} = 0$	$\epsilon_{13} = 0$
$e_{21} = 0$	$e_{22} = 0$	$e_{23} = 0$	$e_{24} = 0$	$e_{25} = 0.99$	$e_{26} = 0$	$\epsilon_{21} = 0$	$\epsilon_{22} = 34.2$	$\epsilon_{23} = 0$
$e_{31} = 0$	$e_{32} = 0$	$e_{33} = 0$	$e_{34} = 0$	$e_{35} = 0$	$e_{36} = 0.99$	$\epsilon_{31} = 0$	$\epsilon_{32} = 0$	$\epsilon_{33} = 34.2$

$$\rho = 9.2 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material: $\text{Bi}_{12}\text{GeO}_{20}$

Crystal Group: 23

Reference: (Slobodnik & Sethares, 71)

$c_{11}^E = 1.2848$	$c_{12}^E = 0.2942$	$c_{13}^E = 0.2942$	$c_{14}^E = 0$	$c_{15}^E = 0$	$c_{16}^E = 0$	$e_{11} = 0$	$e_{21} = 0$	$e_{31} = 0$
$c_{21}^E = 0.2942$	$c_{22}^E = 1.2848$	$c_{23}^E = 0.2942$	$c_{24}^E = 0$	$c_{25}^E = 0$	$c_{26}^E = 0$	$e_{12} = 0$	$e_{22} = 0$	$e_{32} = 0$
$c_{31}^E = 0.2942$	$c_{32}^E = 0.2942$	$c_{33}^E = 1.2848$	$c_{34}^E = 0$	$c_{35}^E = 0$	$c_{36}^E = 0$	$e_{13} = 0$	$e_{23} = 0$	$e_{33} = 0$
$c_{41}^E = 0$	$c_{42}^E = 0$	$c_{43}^E = 0$	$c_{44}^E = 0.2552$	$c_{45}^E = 0$	$c_{46}^E = 0$	$e_{14} = 0.983$	$e_{24} = 0$	$e_{34} = 0$
$c_{51}^E = 0$	$c_{52}^E = 0$	$c_{53}^E = 0$	$c_{54}^E = 0$	$c_{55}^E = 0.2552$	$c_{56}^E = 0$	$e_{15} = 0$	$e_{25} = 0.983$	$e_{35} = 0$
$c_{61}^E = 0$	$c_{62}^E = 0$	$c_{63}^E = 0$	$c_{64}^E = 0$	$c_{65}^E = 0$	$c_{66}^E = 0.2552$	$e_{16} = 0$	$e_{26} = 0$	$e_{36} = 0.983$
$e_{11} = 0$	$e_{12} = 0$	$e_{13} = 0$	$e_{14} = 0.983$	$e_{15} = 0$	$e_{16} = 0$	$\epsilon_{11} = 33.6$	$\epsilon_{12} = 0$	$\epsilon_{13} = 0$
$e_{21} = 0$	$e_{22} = 0$	$e_{23} = 0$	$e_{24} = 0$	$e_{25} = 0.983$	$e_{26} = 0$	$e_{21} = 0$	$e_{22} = 33.6$	$e_{23} = 0$
$e_{31} = 0$	$e_{32} = 0$	$e_{33} = 0$	$e_{34} = 0$	$e_{35} = 0$	$e_{36} = 0.983$	$\epsilon_{31} = 0$	$\epsilon_{32} = 0$	$\epsilon_{33} = 33.6$

$$\rho = 9.2 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material: $\text{Bi}_{12}\text{GeO}_{20}$

Crystal Group: 23

References: (Kraut et al, 1970)

$c_{11}^E = 0.907$	$c_{12}^E = 0.581$	$c_{13}^E = 0.510$	$c_{14}^E = 0$	$c_{15}^E = 0$	$c_{16}^E = 0$	$e_{11} = 0$	$e_{21} = 0$	$e_{31} = -0.244$
$c_{21}^E = 0.581$	$c_{22}^E = 0.907$	$c_{23}^E = 0.510$	$c_{24}^E = 0$	$c_{25}^E = 0$	$c_{26}^E = 0$	$e_{12} = 0$	$e_{22} = 0$	$e_{32} = -0.244$
$c_{31}^E = 0.510$	$c_{32}^E = 0.510$	$c_{33}^E = 0.938$	$c_{34}^E = 0$	$c_{35}^E = 0$	$c_{36}^E = 0$	$e_{13} = 0$	$e_{23} = 0$	$e_{33} = 0.44$
$c_{41}^E = 0$	$c_{42}^E = 0$	$c_{43}^E = 0$	$c_{44}^E = 0.150$	$c_{45}^E = 0$	$c_{46}^E = 0$	$e_{14} = 0$	$e_{24} = -0.210$	$e_{34} = 0$
$c_{51}^E = 0$	$c_{52}^E = 0$	$c_{53}^E = 0$	$c_{54}^E = 0$	$c_{55}^E = 0.150$	$c_{56}^E = 0$	$e_{15} = -0.21$	$e_{25} = 0$	$e_{35} = 0$
$c_{61}^E = 0$	$c_{62}^E = 0$	$c_{63}^E = 0$	$c_{64}^E = 0$	$c_{65}^E = 0$	$c_{66}^E = 0.163$	$e_{16} = 0$	$e_{26} = 0$	$e_{36} = 0$
$e_{11}^S = 0$	$e_{12}^S = 0$	$e_{13}^S = 0$	$e_{14}^S = 0$	$e_{15}^S = -0.210$	$e_{16}^S = 0$	$e_{11}^S = 7.98$	$e_{12}^S = 0$	$e_{13}^S = 0$
$e_{21}^S = 0$	$e_{22}^S = 0$	$e_{23}^S = 0$	$e_{24}^S = -0.210$	$e_{25}^S = 0$	$e_{26}^S = 0$	$e_{21}^S = 0$	$e_{22}^S = 7.98$	$e_{23}^S = 0$
$e_{31}^S = -0.244$	$e_{32}^S = -0.244$	$e_{33}^S = 0.44$	$e_{34}^S = 0$	$e_{35}^S = 0$	$e_{36}^S = 0$	$e_{31}^S = 0$	$e_{32}^S = 0$	$e_{33}^S = 8.43$

$$\rho = 4.82 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material: CdS

Crystal Group: 6mm

References: (Berlincourt, et al, 63) (Jaffee and Berlincourt, 65)

$c_{11} = 3.140$	$c_{12} = 0.8341$	$c_{13} = 0.8341$	$c_{14} = 0$	$c_{15} = 0$	$c_{16} = 0$
$c_{21} = 0.8341$	$c_{22} = 3.140$	$c_{23} = 0.8341$	$c_{24} = 0$	$c_{25} = 0$	$c_{26} = 0$
$c_{31} = 0.8341$	$c_{32} = 0.8341$	$c_{33} = 3.140$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$
$c_{41} = 0$	$c_{42} = 0$	$c_{43} = 0$	$c_{44} = 1.153$	$c_{45} = 0$	$c_{46} = 0$
$c_{51} = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 1.153$	$c_{56} = 0$
$c_{61} = 0$	$c_{62} = 0$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = 0$	$c_{66} = 1.153$

$$\rho = 7.1 \times 10^3 \text{ kg/m}^3$$

Elastic Constants (in 10^{11} N/m^2)

Material: Chromium

Crystal Group: Polycrystalline

References: (Smithells, 67)

$c_{11} = 2.106$	$c_{12} = 1.078$	$c_{13} = 1.078$	$c_{14} = 0$	$c_{15} = 0$	$c_{16} = 0$
$c_{21} = 1.078$	$c_{22} = 2.106$	$c_{23} = 1.078$	$c_{24} = 0$	$c_{25} = 0$	$c_{26} = 0$
$c_{31} = 1.078$	$c_{32} = 1.078$	$c_{33} = 2.106$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$
$c_{41} = 0$	$c_{42} = 0$	$c_{43} = 0$	$c_{44} = 0.514$	$c_{45} = 0$	$c_{46} = 0$
$c_{51} = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 0.514$	$c_{56} = 0$
$c_{61} = 0$	$c_{62} = 0$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = 0$	$c_{66} = 0.514$

$$\rho = 8.96 \times 10^3 \text{ kg/m}^3$$

Elastic Constants (in 10^{11} N/m^2)

Material: Copper

Crystal Group: Isotropic

References: (Anderson, 65)

$c_{11} = 10.76$	$c_{12} = 1.250$	$c_{13} = 1.250$	$c_{14} = 0$	$c_{15} = 0$	$c_{16} = 0$
$c_{21} = 1.250$	$c_{22} = 10.76$	$c_{23} = 1.250$	$c_{24} = 0$	$c_{25} = 0$	$c_{26} = 0$
$c_{31} = 1.250$	$c_{32} = 1.250$	$c_{33} = 10.76$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$
$c_{41} = 0$	$c_{42} = 0$	$c_{43} = 0$	$c_{44} = 5.758$	$c_{45} = 0$	$c_{46} = 0$
$c_{51} = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 5.758$	$c_{56} = 0$
$c_{61} = 0$	$c_{62} = 0$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = 0$	$c_{66} = 5.758$

$$\rho = 3.512 \times 10^3$$

Elastic Constants (in 10^{11} N/m^2)

Material: Diamond

Crystal Group: Cubic

References: (McSkimin & Bond, 57)

$c_{11} = 2.51$	$c_{12} = 1.07$	$c_{13} = 1.07$	$c_{14} = 0$	$c_{15} = 0$	$c_{16} = 0$
$c_{21} = 1.07$	$c_{22} = 2.51$	$c_{23} = 1.07$	$c_{24} = 0$	$c_{25} = 0$	$c_{26} = 0$
$c_{31} = 1.07$	$c_{32} = 1.07$	$c_{33} = 2.51$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$
$c_{41} = 0$	$c_{42} = 0$	$c_{43} = 0$	$c_{44} = 0.762$	$c_{45} = 0$	$c_{46} = 0$
$c_{51} = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 0.762$	$c_{56} = 0$
$c_{61} = 0$	$c_{62} = 0$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = 0$	$c_{66} = 0.762$

$$\rho = 6.28 \times 10^3$$

Elastic Constants (in 10^{11} N/m^2)

Material: $\text{Eu}_3\text{Fe}_{12}\text{O}_{12}$

Crystal Group: Cubic

References: (Bateman, 66)

$c_{11}^E = 0.785$	$c_{12} = 0.161$	$c_{13} = 0.161$	$c_{14} = 0$	$c_{15} = 0$	$c_{16} = 0$	$e_{11} = 0$	$e_{21} = 0$	$e_{31} = 0$
$c_{21} = 0.161$	$c_{22} = 0.785$	$c_{23} = 0.161$	$c_{24} = 0$	$c_{25} = 0$	$c_{26} = 0$	$e_{12} = 0$	$e_{22} = 0$	$e_{32} = 0$
$c_{31} = 0.161$	$c_{32} = 0.161$	$c_{33} = 0.785$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$	$e_{13} = 0$	$e_{23} = 0$	$e_{33} = 0$
$c_{41} = 0$	$c_{42} = 0$	$c_{43} = 0$	$c_{44} = 0.312$	$c_{45} = 0$	$c_{46} = 0$	$e_{14} = 0$	$e_{24} = 0$	$e_{34} = 0$
$c_{51} = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 0.312$	$c_{56} = 0$	$e_{15} = 0$	$e_{25} = 0$	$e_{35} = 0$
$c_{61} = 0$	$c_{62} = 0$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = 0$	$c_{66} = 0.312$	$e_{16} = 0$	$e_{26} = 0$	$e_{36} = 0$
$e_{11} = 0$	$e_{12} = 0$	$e_{13} = 0$	$e_{14} = 0$	$e_{15} = 0$	$e_{16} = 0$	$e_{11}^S = 3.32$	$e_{12} = 0$	$e_{13} = 0$
$e_{21} = 0$	$e_{22} = 0$	$e_{23} = 0$	$e_{24} = 0$	$e_{25} = 0$	$e_{26} = 0$	$e_{21} = 0$	$e_{22} = 3.32$	$e_{23} = 0$
$e_{31} = 0$	$e_{32} = 0$	$e_{33} = 0$	$e_{34} = 0$	$e_{35} = 0$	$e_{36} = 0$	$e_{31} = 0$	$e_{32} = 0$	$e_{33} = 3.32$

$$\rho = 2.2 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material: Fused Quartz

Crystal Group: Isotropic

References: (Mason, 58; Dell Optics, 68)

$c_{11} = 2.858$	$c_{12} = 1.150$	$c_{13} = 1.150$	$c_{14} = 0$	$c_{15} = 0$	$c_{16} = 0$
$c_{21} = 1.150$	$c_{22} = 2.858$	$c_{23} = 1.150$	$c_{24} = 0$	$c_{25} = 0$	$c_{26} = 0$
$c_{31} = 1.150$	$c_{32} = 1.150$	$c_{33} = 2.858$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$
$c_{41} = 0$	$c_{42} = 0$	$c_{43} = 0$	$c_{44} = 0.903$	$c_{45} = 0$	$c_{46} = 0$
$c_{51} = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 0.903$	$c_{56} = 0$
$c_{61} = 0$	$c_{62} = 0$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = 0$	$c_{66} = 0.903$

$$\rho = 7.094 \times 10^3 \text{ kg/m}^3$$

Elastic Constants (in 10^{11} N/m^2)

Material: Gadolinium Gallium Garnet

Crystal Group: Cubic

References: (Graham and Chang, 70)

$\epsilon_{11}^p = 1.19$	$\epsilon_{12}^p = 0.538$	$\epsilon_{13}^p = 0.538$	$\epsilon_{14}^p = 0$	$\epsilon_{15}^p = 0$	$\epsilon_{16}^p = 0$	$\epsilon_{11}^e = 0$	$\epsilon_{21}^e = 0$	$\epsilon_{31}^e = 0$
$\epsilon_{21}^p = 0.538$	$\epsilon_{22}^p = 1.19$	$\epsilon_{23}^p = 0.538$	$\epsilon_{24}^p = 0$	$\epsilon_{25}^p = 0$	$\epsilon_{26}^p = 0$	$\epsilon_{12}^e = 0$	$\epsilon_{22}^e = 0$	$\epsilon_{32}^e = 0$
$\epsilon_{31}^p = 0.538$	$\epsilon_{32}^p = 0.538$	$\epsilon_{33}^p = 1.19$	$\epsilon_{34}^p = 0$	$\epsilon_{35}^p = 0$	$\epsilon_{36}^p = 0$	$\epsilon_{13}^e = 0$	$\epsilon_{23}^e = 0$	$\epsilon_{33}^e = 0$
$\epsilon_{41}^p = 0$	$\epsilon_{42}^p = 0$	$\epsilon_{43}^p = 0$	$\epsilon_{44}^p = 0.595$	$\epsilon_{45}^p = 0$	$\epsilon_{46}^p = 0$	$\epsilon_{14}^e = -0.160$	$\epsilon_{24}^e = 0$	$\epsilon_{34}^e = 0$
$\epsilon_{51}^p = 0$	$\epsilon_{52}^p = 0$	$\epsilon_{53}^p = 0$	$\epsilon_{54}^p = 0$	$\epsilon_{55}^p = 0.595$	$\epsilon_{56}^p = 0$	$\epsilon_{15}^e = 0$	$\epsilon_{25}^e = -0.160$	$\epsilon_{35}^e = 0$
$\epsilon_{61}^p = 0$	$\epsilon_{62}^p = 0$	$\epsilon_{63}^p = 0$	$\epsilon_{64}^p = 0$	$\epsilon_{65}^p = 0$	$\epsilon_{66}^p = 0.595$	$\epsilon_{16}^e = 0$	$\epsilon_{26}^e = 0$	$\epsilon_{36}^e = -0.160$
$\epsilon_{11}^s = 0$	$\epsilon_{12}^s = 0$	$\epsilon_{13}^s = 0$	$\epsilon_{14}^s = -0.160$	$\epsilon_{15}^s = 0$	$\epsilon_{16}^s = 0$	$\epsilon_{11}^s = 9.735$	$\epsilon_{12}^s = 0$	$\epsilon_{13}^s = 0$
$\epsilon_{21}^s = 0$	$\epsilon_{22}^s = 0$	$\epsilon_{23}^s = 0$	$\epsilon_{24}^s = 0$	$\epsilon_{25}^s = -0.160$	$\epsilon_{26}^s = 0$	$\epsilon_{21}^s = 0$	$\epsilon_{22}^s = 9.735$	$\epsilon_{23}^s = 0$
$\epsilon_{31}^s = 0$	$\epsilon_{32}^s = 0$	$\epsilon_{33}^s = 0$	$\epsilon_{34}^s = 0$	$\epsilon_{35}^s = 0$	$\epsilon_{36}^s = -0.160$	$\epsilon_{31}^s = 0$	$\epsilon_{32}^s = 0$	$\epsilon_{33}^s = 9.735$

$$\rho = 5.31 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material: GaAs

Crystal Group: $\bar{F}3m$

References: (Drabble and Brummer, 66) (Walsh, 66) (Arlt and Quadflieg, 68)

$c_{11}^E = 1.29$	$c_{12}^E = 0.479$	$c_{13}^E = 0.479$	$c_{14}^E = 0$	$c_{15}^E = 0$	$c_{16}^E = 0$	$e_{11}^E = 0$	$e_{21}^E = 0$	$e_{31}^E = 0$
$c_{21}^E = 0.479$	$c_{22}^E = 1.29$	$c_{23}^E = 0.479$	$c_{24}^E = 0$	$c_{25}^E = 0$	$c_{26}^E = 0$	$e_{12}^E = 0$	$e_{22}^E = 0$	$e_{32}^E = 0$
$c_{31}^E = 0.479$	$c_{32}^E = 0.479$	$c_{33}^E = 1.29$	$c_{34}^E = 0$	$c_{35}^E = 0$	$c_{36}^E = 0$	$e_{13}^E = 0$	$e_{23}^E = 0$	$e_{33}^E = 0$
$c_{41}^E = 0$	$c_{42}^E = 0$	$c_{43}^E = 0$	$c_{44}^E = 0.67$	$c_{45}^E = 0$	$c_{46}^E = 0$	$e_{14}^E = 0$	$e_{24}^E = 0$	$e_{34}^E = 0$
$c_{51}^E = 0$	$c_{52}^E = 0$	$c_{53}^E = 0$	$c_{54}^E = 0$	$c_{55}^E = 0.67$	$c_{56}^E = 0$	$e_{15}^E = 0$	$e_{25}^E = 0$	$e_{35}^E = 0$
$c_{61}^E = 0$	$c_{62}^E = 0$	$c_{63}^E = 0$	$c_{64}^E = 0$	$c_{65}^E = 0$	$c_{66}^E = 0.67$	$e_{16}^E = 0$	$e_{26}^E = 0$	$e_{36}^E = 0$
$e_{11}^S = 0$	$e_{12}^S = 0$	$e_{13}^S = 0$	$e_{14}^S = 0$	$e_{15}^S = 0$	$e_{16}^S = 0$	$s_{11}^S = 14.16$	$e_{12}^S = 0$	$e_{13}^S = 0$
$e_{21}^S = 0$	$e_{22}^S = 0$	$e_{23}^S = 0$	$e_{24}^S = 0$	$e_{25}^S = 0$	$e_{26}^S = 0$	$e_{21}^S = 0$	$e_{22}^S = 14.16$	$e_{23}^S = 0$
$e_{31}^S = 0$	$e_{32}^S = 0$	$e_{33}^S = 0$	$e_{34}^S = 0$	$e_{35}^S = 0$	$e_{36}^S = 0$	$e_{31}^S = 0$	$e_{32}^S = 0$	$e_{33}^S = 14.16$

$$\rho = 5.32 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material: Germanium

Crystal Group: $m\bar{3}m$

References: (Egle-Picher; Cornell, 52)

$c_{11} = 2.202$	$c_{12} = 1.604$	$c_{13} = 1.604$	$c_{14} = 0$	$c_{15} = 0$	$c_{16} = 0$
$c_{21} = 1.604$	$c_{22} = 2.202$	$c_{23} = 1.604$	$c_{24} = 0$	$c_{25} = 0$	$c_{26} = 0$
$c_{31} = 1.604$	$c_{32} = 1.604$	$c_{33} = 2.202$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$
$c_{41} = 0$	$c_{42} = 0$	$c_{43} = 0$	$c_{44} = 0.299$	$c_{45} = 0$	$c_{46} = 0$
$c_{51} = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 0.299$	$c_{56} = 0$
$c_{61} = 0$	$c_{62} = 0$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = 0$	$c_{66} = 0.299$

$$\rho = 19.3 \times 10^3 \text{ kg/m}^3$$

Elastic Constants (in 10^{11} N/m^2)

Material: Gold

Crystal Group: Isotropic

References: (Anderson, 65)

$c_{11}^F = 0.672$	$c_{12} = 0.367$	$c_{13} = 0.367$	$c_{14} = 0$	$c_{15} = 0$	$c_{16} = 0$	$c_{11} = 0$	$c_{21} = 0$	$c_{31} = 0$
$c_{21} = 0.367$	$c_{22} = 0.672$	$c_{23} = 0.367$	$c_{24} = 0$	$c_{25} = 0$	$c_{26} = 0$	$c_{12} = 0$	$c_{22} = 0$	$c_{32} = 0$
$c_{31} = 0.367$	$c_{32} = 0.367$	$c_{33} = 0.672$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$	$c_{13} = 0$	$c_{23} = 0$	$c_{33} = 0$
$c_{41} = 0$	$c_{42} = 0$	$c_{43} = 0$	$c_{44} = 0.302$	$c_{45} = 0$	$c_{46} = 0$	$c_{14} = -0.071$	$c_{24} = 0$	$c_{34} = 0$
$c_{51} = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 0.302$	$c_{56} = 0$	$c_{15} = 0$	$c_{25} = -0.071$	$c_{35} = 0$
$c_{61} = 0$	$c_{62} = 0$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = 0$	$c_{66} = 0.302$	$c_{16} = 0$	$c_{26} = 0$	$c_{36} = -0.071$
$c_{11}^S = 0$	$c_{12} = 0$	$c_{13} = 0$	$c_{14} = -0.071$	$c_{15} = 0$	$c_{16} = 0$	$c_{11}^S = 14.15$	$c_{12} = 0$	$c_{13} = 0$
$c_{21} = 0$	$c_{22} = 0$	$c_{23} = 0$	$c_{24} = 0$	$c_{25} = -0.071$	$c_{26} = 0$	$c_{21} = 0$	$c_{22} = 14.15$	$c_{23} = 0$
$c_{31} = 0$	$c_{32} = 0$	$c_{33} = 0$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = -0.071$	$c_{31} = 0$	$c_{32} = 0$	$c_{33} = 14.15$

$$\rho = 5.77 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material: InSb

Crystal Group: $\bar{4}3m$

References: (Potter, 56) (Pauwels, 64) (Arit and Quadflieg, 68)

$\epsilon_{11}^E = 0.8329$	$\epsilon_{12} = 0.4526$	$\epsilon_{13} = 0.4526$	$\epsilon_{14} = 0$	$\epsilon_{15} = 0$	$\epsilon_{16} = 0$	$\epsilon_{11} = 0$	$\epsilon_{21} = 0$	$\epsilon_{31} = 0$
$\epsilon_{21} = 0.4526$	$\epsilon_{22} = 0.8329$	$\epsilon_{23} = 0.4526$	$\epsilon_{24} = 0$	$\epsilon_{25} = 0$	$\epsilon_{26} = 0$	$\epsilon_{12} = 0$	$\epsilon_{22} = 0$	$\epsilon_{32} = 0$
$\epsilon_{31} = 0.4526$	$\epsilon_{32} = 0.4526$	$\epsilon_{33} = 0.8329$	$\epsilon_{34} = 0$	$\epsilon_{35} = 0$	$\epsilon_{36} = 0$	$\epsilon_{13} = 0$	$\epsilon_{23} = 0$	$\epsilon_{33} = 0$
$\epsilon_{41} = 0$	$\epsilon_{42} = 0$	$\epsilon_{43} = 0$	$\epsilon_{44} = 0.3959$	$\epsilon_{45} = 0$	$\epsilon_{46} = 0$	$\epsilon_{14} = -0.045$	$\epsilon_{24} = 0$	$\epsilon_{34} = 0$
$\epsilon_{51} = 0$	$\epsilon_{52} = 0$	$\epsilon_{53} = 0$	$\epsilon_{54} = 0$	$\epsilon_{55} = 0.3959$	$\epsilon_{56} = 0$	$\epsilon_{15} = 0$	$\epsilon_{25} = -0.045$	$\epsilon_{35} = 0$
$\epsilon_{61} = 0$	$\epsilon_{62} = 0$	$\epsilon_{63} = 0$	$\epsilon_{64} = 0$	$\epsilon_{65} = 0$	$\epsilon_{66} = 0.3959$	$\epsilon_{16} = 0$	$\epsilon_{26} = 0$	$\epsilon_{36} = -0.045$
$\epsilon_{11}^S = 0$	$\epsilon_{12} = 0$	$\epsilon_{13} = 0$	$\epsilon_{14} = -0.045$	$\epsilon_{15} = 0$	$\epsilon_{16} = 0$	$\epsilon_{11}^S = 12.8$	$\epsilon_{12} = 0$	$\epsilon_{13} = 0$
$\epsilon_{21} = 0$	$\epsilon_{22} = 0$	$\epsilon_{23} = 0$	$\epsilon_{24} = 0$	$\epsilon_{25} = -0.045$	$\epsilon_{26} = 0$	$\epsilon_{21} = 0$	$\epsilon_{22} = 12.8$	$\epsilon_{23} = 0$
$\epsilon_{31} = 0$	$\epsilon_{32} = 0$	$\epsilon_{33} = 0$	$\epsilon_{34} = 0$	$\epsilon_{35} = 0$	$\epsilon_{36} = -0.045$	$\epsilon_{31} = 0$	$\epsilon_{32} = 0$	$\epsilon_{33} = 12.8$

$$\rho = 5.70 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material:- InAs

Crystal Group: $\bar{4}3m$

References: (Gerlich, 64) (Landolt - Börnstein) (Arlt and Quadflieg, 68)

$c_{11} = 1.092$	$c_{12} = 0.683$	$c_{13} = 0.528$	$c_{14} = 0$	$c_{15} = 0$	$c_{16} = 0.136$
$c_{21} = 0.683$	$c_{22} = 1.092$	$c_{23} = 0.528$	$c_{24} = 0$	$c_{25} = 0$	$c_{26} = -0.136$
$c_{31} = 0.528$	$c_{32} = 0.528$	$c_{33} = 0.917$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$
$c_{41} = 0$	$c_{42} = 0$	$c_{43} = 0$	$c_{44} = 0.267$	$c_{45} = 0$	$c_{46} = 0$
$c_{51} = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 0.267$	$c_{56} = 0$
$c_{61} = 0.136$	$c_{62} = 0.136$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = 0$	$c_{66} = 0.337$

$$\rho = 6.95 \times 10^3 \text{ kg/m}^3$$

Elastic Constants (in 10^{11} N/m^2)

Material: Lead Molybdate

Crystal Group: 4/m

References: (Coquin, Pinnow & Warner, 71)

$c_{11} = 1.24$	$c_{12} = 0.33$	$c_{13} = 0.33$	$c_{14} = 0$	$c_{15} = 0$	$c_{16} = 0$
$c_{21} = 0.33$	$c_{22} = 1.24$	$c_{23} = 0.33$	$c_{24} = 0$	$c_{25} = 0$	$c_{26} = 0$
$c_{31} = 0.33$	$c_{32} = 0.33$	$c_{33} = 1.24$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$
$c_{41} = 0$	$c_{42} = 0$	$c_{43} = 0$	$c_{44} = 0.23$	$c_{45} = 0$	$c_{46} = 0$
$c_{51} = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 0.23$	$c_{56} = 0$
$c_{61} = 0$	$c_{62} = 0$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = 0$	$c_{66} = 0.23$

$$\rho = 7.50 \times 10^3$$

Elastic Constants (in 10^{11} N/m^2)

Material: PbS
 Crystal Group: Cubic
 References: (Elcombe, 67)

$c_{11}^E = 2.03$	$c_{12} = 0.573$	$c_{13} = 0.752$	$c_{14} = 0.085$	$c_{15} = 0$	$c_{16} = 0$	$e_{11} = 0$	$e_{21} = -2.43$	$e_{31} = 0.23$
$c_{21}^E = 0.573$	$c_{22} = 2.03$	$c_{23} = 0.752$	$c_{24} = -0.085$	$c_{25} = 0$	$c_{26} = 0$	$e_{12} = 0$	$e_{22} = 2.43$	$e_{32} = 0.23$
$c_{31}^E = 0.752$	$c_{32} = 0.752$	$c_{33} = 2.424$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$	$e_{13} = 0$	$e_{23} = 0$	$e_{33} = 1.33$
$c_{41}^E = 0.085$	$c_{42} = -0.085$	$c_{43} = 0$	$c_{44} = 0.595$	$c_{45} = 0$	$c_{46} = 0$	$e_{14} = 0$	$e_{24} = 3.76$	$e_{34} = 0$
$c_{51}^E = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 0.595$	$c_{56} = 0.085$	$e_{15} = 3.76$	$e_{25} = 0$	$e_{35} = 0$
$c_{61}^E = 0$	$c_{62} = 0$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = 0.085$	$c_{66} = 0.7285$	$e_{16} = -2.43$	$e_{26} = 0$	$e_{36} = 0$
$e_{11} = 0$	$e_{12} = 0$	$e_{13} = 0$	$e_{14} = 0$	$e_{15} = 3.76$	$e_{16} = -2.43$	$\epsilon_{11}^S = 39.2$	$\epsilon_{12} = 0$	$\epsilon_{13} = 0$
$e_{21} = -2.43$	$e_{22} = 2.43$	$e_{23} = 0$	$e_{24} = 3.76$	$e_{25} = 0$	$e_{26} = 0$	$\epsilon_{21} = 0$	$\epsilon_{22} = 39.2$	$\epsilon_{23} = 0$
$e_{31} = 0.23$	$e_{32} = 0.23$	$e_{33} = 1.33$	$e_{34} = 0$	$e_{35} = 0$	$e_{36} = 0$	$\epsilon_{31} = 0$	$\epsilon_{32} = 0$	$\epsilon_{33} = 24.7$

$$\rho = 4.64 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material: LiNbO_3

Crystal Group: 3m

Reference: (Smith & Welsh, 71)

$\epsilon_{11}^E = 2.03$	$\epsilon_{12} = 0.53$	$\epsilon_{13} = 0.75$	$\epsilon_{14} = 0.09$	$\epsilon_{15} = 0$	$\epsilon_{16} = 0$	$\epsilon_{11} = 0$	$\epsilon_{21} = -2.5$	$\epsilon_{31} = 0.2$
$\epsilon_{21} = 0.53$	$\epsilon_{22} = 2.03$	$\epsilon_{23} = 0.75$	$\epsilon_{24} = -0.09$	$\epsilon_{25} = 0$	$\epsilon_{26} = 0$	$\epsilon_{12} = 0$	$\epsilon_{22} = 2.5$	$\epsilon_{32} = 0.2$
$\epsilon_{31} = 0.75$	$\epsilon_{32} = 0.75$	$\epsilon_{33} = 2.45$	$\epsilon_{34} = 0$	$\epsilon_{35} = 0$	$\epsilon_{36} = 0$	$\epsilon_{13} = 0$	$\epsilon_{23} = 0$	$\epsilon_{33} = 1.3$
$\epsilon_{41} = 0.09$	$\epsilon_{42} = -0.09$	$\epsilon_{43} = 0$	$\epsilon_{44} = 0.60$	$\epsilon_{45} = 0$	$\epsilon_{46} = 0$	$\epsilon_{14} = 0$	$\epsilon_{24} = 3.7$	$\epsilon_{34} = 0$
$\epsilon_{51} = 0$	$\epsilon_{52} = 0$	$\epsilon_{53} = 0$	$\epsilon_{54} = 0$	$\epsilon_{55} = 0.60$	$\epsilon_{56} = 0.09$	$\epsilon_{15} = 3.7$	$\epsilon_{25} = 0$	$\epsilon_{35} = 0$
$\epsilon_{61} = 0$	$\epsilon_{62} = 0$	$\epsilon_{63} = 0$	$\epsilon_{64} = 0$	$\epsilon_{65} = 0.09$	$\epsilon_{66} = 0.75$	$\epsilon_{16} = -2.5$	$\epsilon_{26} = 0$	$\epsilon_{36} = 0$
$\epsilon_{11} = 0$	$\epsilon_{12} = 0$	$\epsilon_{13} = 0$	$\epsilon_{14} = 0$	$\epsilon_{15} = 3.7$	$\epsilon_{16} = -2.5$	$\epsilon_{11}^S = 38.9$	$\epsilon_{12} = 0$	$\epsilon_{13} = 0$
$\epsilon_{21} = -2.5$	$\epsilon_{22} = 2.5$	$\epsilon_{23} = 0$	$\epsilon_{24} = 3.7$	$\epsilon_{25} = 0$	$\epsilon_{26} = 0$	$\epsilon_{21} = 0$	$\epsilon_{22} = 38.9$	$\epsilon_{23} = 0$
$\epsilon_{31} = 0.2$	$\epsilon_{32} = 0.2$	$\epsilon_{33} = 1.3$	$\epsilon_{34} = 0$	$\epsilon_{35} = 0$	$\epsilon_{36} = 0$	$\epsilon_{31} = 0$	$\epsilon_{32} = 0$	$\epsilon_{33} = 25.7$

$$\rho = 4.7 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material: LiNbO_3

Crystal Group: $3m$

References: (Warner et al, 67)

$c_{11}^E = 2.02$	$c_{12} = 0.557$	$c_{13} = 0.690$	$c_{14} = 0.0748$	$c_{15} = 0$	$c_{16} = 0$	$e_{11} = 0$	$e_{21} = -2.52$	$e_{31} = 0.75$
$c_{21} = 0.557$	$c_{22} = 2.02$	$c_{23} = 0.690$	$c_{24} = -0.0748$	$c_{25} = 0$	$c_{26} = 0$	$e_{12} = 0$	$e_{22} = 2.52$	$e_{32} = 0.75$
$c_{31} = 0.690$	$c_{32} = 0.690$	$c_{33} = 2.40$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$	$e_{13} = 0$	$e_{23} = 0$	$e_{33} = 1.67$
$c_{41} = 0.0748$	$c_{42} = -0.0748$	$c_{43} = 0$	$c_{44} = 0.607$	$c_{45} = 0$	$c_{46} = 0$	$e_{14} = 0$	$e_{24} = 3.60$	$e_{34} = 0$
$c_{51} = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 0.607$	$c_{56} = 0.0748$	$e_{15} = 3.60$	$e_{25} = 0$	$e_{35} = 0$
$c_{61} = 0$	$c_{62} = 0$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = 0.0748$	$c_{66} = 0.729$	$e_{16} = -2.52$	$e_{26} = 0$	$e_{36} = 0$
$e_{11} = 0$	$e_{12} = 0$	$e_{13} = 0$	$e_{14} = 0$	$e_{15} = 3.60$	$e_{16} = -2.52$	$\epsilon_{11}^S = 39.8$	$\epsilon_{12} = 0$	$\epsilon_{13} = 0$
$e_{21} = -2.52$	$e_{22} = 2.52$	$e_{23} = 0$	$e_{24} = 3.60$	$e_{25} = 0$	$e_{26} = 0$	$\epsilon_{21} = 0$	$\epsilon_{22} = 39.8$	$\epsilon_{23} = 0$
$e_{31} = 0.75$	$e_{32} = 0.75$	$e_{33} = 1.67$	$e_{34} = 0$	$e_{35} = 0$	$e_{36} = 0$	$\epsilon_{31} = 0$	$\epsilon_{32} = 0$	$\epsilon_{33} = 24.3$

$$\rho = 4.7 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material: LiNbO_3

Crystal Group: 3m

Reference: (Korolyuk, Matsakov & Vasil'chenko, 71)

$\epsilon_{11}^E = 2.298$	$c_{12} = 0.44$	$c_{13} = 0.812$	$c_{14} = -0.104$	$c_{15} = 0$	$c_{16} = 0$	$e_{11} = 0$	$e_{21} = -1.67$	$e_{31} = -0.38$
$c_{21} = 0.44$	$c_{22} = 2.298$	$c_{23} = 0.812$	$c_{24} = 0.104$	$c_{25} = 0$	$c_{26} = 0$	$e_{12} = 0$	$e_{22} = 1.67$	$e_{32} = -0.38$
$c_{31} = 0.812$	$c_{32} = 0.812$	$c_{33} = 2.798$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$	$e_{13} = 0$	$e_{23} = 0$	$e_{33} = 1.09$
$c_{41} = -0.104$	$c_{42} = 0.104$	$c_{43} = 0$	$c_{44} = 0.968$	$c_{45} = 0$	$c_{46} = 0$	$e_{14} = 0$	$e_{24} = 2.72$	$e_{34} = 0$
$c_{51} = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 0.968$	$c_{56} = -0.104$	$e_{15} = 2.72$	$e_{25} = 0$	$e_{35} = 0$
$c_{61} = 0$	$c_{62} = 0$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = -0.104$	$c_{66} = 0.929$	$e_{16} = -1.67$	$e_{26} = 0$	$e_{36} = 0$
$e_{11} = 0$	$e_{12} = 0$	$e_{13} = 0$	$e_{14} = 0$	$e_{15} = 2.72$	$e_{16} = -1.67$	$\epsilon_{11}^S = 37.7$	$\epsilon_{12} = 0$	$\epsilon_{13} = 0$
$e_{21} = -1.67$	$e_{22} = 1.67$	$e_{23} = 0$	$e_{24} = 2.72$	$e_{25} = 0$	$e_{26} = 0$	$\epsilon_{21} = 0$	$\epsilon_{22} = 37.7$	$\epsilon_{23} = 0$
$e_{31} = -0.38$	$e_{32} = -0.38$	$e_{33} = 1.09$	$e_{34} = 0$	$e_{35} = 0$	$e_{36} = 0$	$\epsilon_{31} = 0$	$\epsilon_{32} = 0$	$\epsilon_{33} = 37.9$

$$\rho = 7.454 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material: LiTaO_3
 Crystal Group: $3m$
 Reference: (Smith & Welsh, 71)

$\epsilon_{11}^E = 2.33$	$\epsilon_{12}^E = 0.47$	$\epsilon_{13}^E = 0.80$	$\epsilon_{14}^E = -0.11$	$\epsilon_{15}^E = 0$	$\epsilon_{16}^E = 0$	$\epsilon_{11}^E = 0$	$\epsilon_{21}^E = -1.6$	$\epsilon_{31}^E = 0$
$\epsilon_{21}^E = 0.47$	$\epsilon_{22}^E = 2.33$	$\epsilon_{23}^E = 0.80$	$\epsilon_{24}^E = 0.11$	$\epsilon_{25}^E = 0$	$\epsilon_{26}^E = 0$	$\epsilon_{12}^E = 0$	$\epsilon_{22}^E = 1.6$	$\epsilon_{32}^E = 0$
$\epsilon_{31}^E = 0.80$	$\epsilon_{32}^E = 0.80$	$\epsilon_{33}^E = 2.75$	$\epsilon_{34}^E = 0$	$\epsilon_{35}^E = 0$	$\epsilon_{36}^E = 0$	$\epsilon_{13}^E = 0$	$\epsilon_{23}^E = 0$	$\epsilon_{33}^E = 1.9$
$\epsilon_{41}^E = -0.11$	$\epsilon_{42}^E = 0.11$	$\epsilon_{43}^E = 0$	$\epsilon_{44}^E = 0.94$	$\epsilon_{45}^E = 0$	$\epsilon_{46}^E = 0$	$\epsilon_{14}^E = 0$	$\epsilon_{24}^E = 2.6$	$\epsilon_{34}^E = 0$
$\epsilon_{51}^E = 0$	$\epsilon_{52}^E = 0$	$\epsilon_{53}^E = 0$	$\epsilon_{54}^E = 0$	$\epsilon_{55}^E = 0.94$	$\epsilon_{56}^E = -0.11$	$\epsilon_{15}^E = 2.6$	$\epsilon_{25}^E = 0$	$\epsilon_{35}^E = 0$
$\epsilon_{61}^E = 0$	$\epsilon_{62}^E = 0$	$\epsilon_{63}^E = 0$	$\epsilon_{64}^E = 0$	$\epsilon_{65}^E = -0.11$	$\epsilon_{66}^E = 0.93$	$\epsilon_{16}^E = -1.6$	$\epsilon_{26}^E = 0$	$\epsilon_{36}^E = 0$
$\epsilon_{11}^S = 0$	$\epsilon_{12}^S = 0$	$\epsilon_{13}^S = 0$	$\epsilon_{14}^S = 0$	$\epsilon_{15}^S = 2.6$	$\epsilon_{16}^S = -1.6$	$\epsilon_{11}^S = 36.3$	$\epsilon_{12}^S = 0$	$\epsilon_{13}^S = 0$
$\epsilon_{21}^S = -1.6$	$\epsilon_{22}^S = 1.6$	$\epsilon_{23}^S = 0$	$\epsilon_{24}^S = 2.6$	$\epsilon_{25}^S = 0$	$\epsilon_{26}^S = 0$	$\epsilon_{21}^S = 0$	$\epsilon_{22}^S = 36.3$	$\epsilon_{23}^S = 0$
$\epsilon_{31}^S = 0$	$\epsilon_{32}^S = 0$	$\epsilon_{33}^S = 1.9$	$\epsilon_{34}^S = 0$	$\epsilon_{35}^S = 0$	$\epsilon_{36}^S = 0$	$\epsilon_{31}^S = 0$	$\epsilon_{32}^S = 0$	$\epsilon_{33}^S = 38.1$

$$\rho = 7.45 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material: LiTaO_3

Crystal Group: $3m$

References: (Warner et al, 67)

$c_{11} = 2.964$	$c_{12} = 0.95$	$c_{13} = 0.95$	$c_{14} = 0$	$c_{15} = 0$	$c_{16} = 0$
$c_{21} = 0.95$	$c_{22} = 2.964$	$c_{23} = 0.95$	$c_{24} = 0$	$c_{25} = 0$	$c_{26} = 0$
$c_{31} = 0.95$	$c_{32} = 0.95$	$c_{33} = 2.964$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$
$c_{41} = 0$	$c_{42} = 0$	$c_{43} = 0$	$c_{44} = 1.56$	$c_{45} = 0$	$c_{46} = 0$
$c_{51} = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 1.56$	$c_{56} = 0$
$c_{61} = 0$	$c_{62} = 0$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = 0$	$c_{66} = 1.56$

$$\rho = 3583 \times 10^3$$

Elastic Constants (in 10^{11} N/m^2)

Material: MgO

Crystal Group: m3m

References: (Anderson & Andreatch, 66)

$c_{11} = 3.115$	$c_{12} = 1.257$	$c_{13} = 1.257$	$c_{14} = 0$	$c_{15} = 0$	$c_{16} = 0$
$c_{21} = 1.257$	$c_{22} = 3.115$	$c_{23} = 1.257$	$c_{24} = 0$	$c_{25} = 0$	$c_{26} = 0$
$c_{31} = 1.257$	$c_{32} = 1.257$	$c_{33} = 3.115$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$
$c_{41} = 0$	$c_{42} = 0$	$c_{43} = 0$	$c_{44} = 0.929$	$c_{45} = 0$	$c_{46} = 0$
$c_{51} = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 0.929$	$c_{56} = 0$
$c_{61} = 0$	$c_{62} = 0$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = 0$	$c_{66} = 0.929$

$$\rho = 8.9 \times 10^3 \text{ kg/m}^3$$

Elastic Constants (in 10^{11} N/m^2)

Material: Nickel

Crystal Group: Isotropic

References: (Anderson, 65)

$c_{11}^E = 0.867$	$c_{12}^E = 0.07$	$c_{13}^E = 0.119$	$c_{14}^E = -0.179$	$c_{15}^E = 0$	$c_{16}^E = 0$	$c_{11}^g = 0.171$	$c_{21}^g = 0$	$c_{31}^g = 0$
$c_{21}^E = 0.07$	$c_{22}^E = 0.867$	$c_{23}^E = 0.119$	$c_{24}^E = 0.179$	$c_{25}^E = 0$	$c_{26}^E = 0$	$c_{12}^g = -0.171$	$c_{22}^g = 0$	$c_{32}^g = 0$
$c_{31}^E = 0.119$	$c_{32}^E = 0.119$	$c_{33}^E = 1.07$	$c_{34}^E = 0$	$c_{35}^E = 0$	$c_{36}^E = 0$	$c_{13}^g = 0$	$c_{23}^g = 0$	$c_{33}^g = 0$
$c_{41}^E = -0.179$	$c_{42}^E = 0.179$	$c_{43}^E = 0$	$c_{44}^E = 0.579$	$c_{45}^E = 0$	$c_{46}^E = 0$	$c_{14}^g = -0.0406$	$c_{24}^g = 0$	$c_{34}^g = 0$
$c_{51}^E = 0$	$c_{52}^E = 0$	$c_{53}^E = 0$	$c_{54}^E = 0$	$c_{55}^E = 0.579$	$c_{56}^E = -0.179$	$c_{15}^g = 0$	$c_{25}^g = 0.0406$	$c_{35}^g = 0$
$c_{61}^E = 0$	$c_{62}^E = 0$	$c_{63}^E = 0$	$c_{64}^E = 0$	$c_{65}^E = -0.179$	$c_{66}^E = 0.3985$	$c_{16}^g = 0$	$c_{26}^g = -0.171$	$c_{36}^g = 0$
$c_{11}^g = 0.171$	$c_{12}^g = -0.171$	$c_{13}^g = 0$	$c_{14}^g = -0.0406$	$c_{15}^g = 0$	$c_{16}^g = 0$	$c_{11}^g = 3.92$	$c_{12}^g = 0$	$c_{13}^g = 0$
$c_{21}^g = 0$	$c_{22}^g = 0$	$c_{23}^g = 0$	$c_{24}^g = 0$	$c_{25}^g = 0.0406$	$c_{26}^g = -0.171$	$c_{21}^g = 0$	$c_{22}^g = 3.92$	$c_{23}^g = 0$
$c_{31}^g = 0$	$c_{32}^g = 0$	$c_{33}^g = 0$	$c_{34}^g = 0$	$c_{35}^g = 0$	$c_{36}^g = 0$	$c_{31}^g = 0$	$c_{32}^g = 0$	$c_{33}^g = 4.1$

$$\rho = 2.65 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material: Quartz

Crystal Group: 32

References: (Bechmann, 58) (Bechmann et al., 62)

$c_{11}^E = 2.66$	$c_{12}^E = 1.73$	$c_{13}^E = 1.36$	$c_{14}^E = 0$	$c_{15}^E = 0$	$c_{16}^E = 0$	$e_{11}^S = 0$	$e_{21}^S = 0$	$e_{31}^S = 0$
$c_{21}^E = 1.73$	$c_{22}^E = 2.66$	$c_{23}^E = 1.36$	$c_{24}^E = 0$	$c_{25}^E = 0$	$c_{26}^E = 0$	$e_{12}^S = 0$	$e_{22}^S = 0$	$e_{32}^S = 0$
$c_{31}^E = 1.36$	$c_{32}^E = 1.36$	$c_{33}^E = 4.7$	$c_{34}^E = 0$	$c_{35}^E = 0$	$c_{36}^E = 0$	$e_{13}^S = 0$	$e_{23}^S = 0$	$e_{33}^S = 0$
$c_{41}^E = 0$	$c_{42}^E = 0$	$c_{43}^E = 0$	$c_{44}^E = 1.24$	$c_{45}^E = 0$	$c_{46}^E = 0$	$e_{14}^S = 0$	$e_{24}^S = 0$	$e_{34}^S = 0$
$c_{51}^E = 0$	$c_{52}^E = 0$	$c_{53}^E = 0$	$c_{54}^E = 0$	$c_{55}^E = 1.24$	$c_{56}^E = 0$	$e_{15}^S = 0$	$e_{25}^S = 0$	$e_{35}^S = 0$
$c_{61}^E = 0$	$c_{62}^E = 0$	$c_{63}^E = 0$	$c_{64}^E = 0$	$c_{65}^E = 0$	$c_{66}^E = 1.89$	$e_{16}^S = 0$	$e_{26}^S = 0$	$e_{36}^S = 0$
$e_{11}^S = 0$	$e_{12}^S = 0$	$e_{13}^S = 0$	$e_{14}^S = 0$	$e_{15}^S = 0$	$e_{16}^S = 0$	$e_{11}^S = 76.1$	$e_{12}^S = 0$	$e_{13}^S = 0$
$e_{21}^S = 0$	$e_{22}^S = 0$	$e_{23}^S = 0$	$e_{24}^S = 0$	$e_{25}^S = 0$	$e_{26}^S = 0$	$e_{21}^S = 0$	$e_{22}^S = 76.1$	$e_{23}^S = 0$
$e_{31}^S = 0$	$e_{32}^S = 0$	$e_{33}^S = 0$	$e_{34}^S = 0$	$e_{35}^S = 0$	$e_{36}^S = 0$	$e_{31}^S = 0$	$e_{32}^S = 0$	$e_{33}^S = 150.4$

$$\rho = 4.28 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material: Rutile

Crystal Group: $4/m \ 2/m \ 2/m$

References: (National Lead, 67; Traylor et al, 71)

$c_{11}^E = 4.97$	$c_{12}^E = 1.64$	$c_{13}^E = 1.11$	$c_{14}^E = -0.235$	$c_{15}^E = 0$	$c_{16}^E = 0$	$e_{11}^S = 0$	$e_{21}^S = 0$	$e_{31}^S = 0$
$c_{21}^E = 1.64$	$c_{22}^E = 4.97$	$c_{23}^E = 1.11$	$c_{24}^E = 0.235$	$c_{25}^E = 0$	$c_{26}^E = 0$	$e_{12}^S = 0$	$e_{22}^S = 0$	$e_{32}^S = 0$
$c_{31}^E = 1.11$	$c_{32}^E = 1.11$	$c_{33}^E = 4.98$	$c_{34}^E = 0$	$c_{35}^E = 0$	$c_{36}^E = 0$	$e_{13}^S = 0$	$e_{23}^S = 0$	$e_{33}^S = 0$
$c_{41}^E = -0.235$	$c_{42}^E = 0.235$	$c_{43}^E = 0$	$c_{44}^E = 1.47$	$c_{45}^E = 0$	$c_{46}^E = 0$	$e_{14}^S = 0$	$e_{24}^S = 0$	$e_{34}^S = 0$
$c_{51}^E = 0$	$c_{52}^E = 0$	$c_{53}^E = 0$	$c_{54}^E = 0$	$c_{55}^E = 1.47$	$c_{56}^E = -0.235$	$e_{15}^S = 0$	$e_{25}^S = 0$	$e_{35}^S = 0$
$c_{61}^E = 0$	$c_{62}^E = 0$	$c_{63}^E = 0$	$c_{64}^E = 0$	$c_{65}^E = -0.235$	$c_{66}^E = 1.665$	$e_{16}^S = 0$	$e_{26}^S = 0$	$e_{36}^S = 0$
$e_{11}^S = 0$	$e_{12}^S = 0$	$e_{13}^S = 0$	$e_{14}^S = 0$	$e_{15}^S = 0$	$e_{16}^S = 0$	$e_{11}^S = 8.28$	$e_{12}^S = 0$	$e_{13}^S = 0$
$e_{21}^S = 0$	$e_{22}^S = 0$	$e_{23}^S = 0$	$e_{24}^S = 0$	$e_{25}^S = 0$	$e_{26}^S = 0$	$e_{21}^S = 0$	$e_{22}^S = 8.28$	$e_{23}^S = 0$
$e_{31}^S = 0$	$e_{32}^S = 0$	$e_{33}^S = 0$	$e_{34}^S = 0$	$e_{35}^S = 0$	$e_{36}^S = 0$	$e_{31}^S = 0$	$e_{32}^S = 0$	$e_{33}^S = 10.2$

$$\rho = 3.98 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material: Sapphire (Al_2O_3)

Crystal Group: $\bar{3}m$

References: (Wachtman et al, 60 ; McFarlane)

$\epsilon_{11}^S = 1.66$	$\epsilon_{12} = 0.639$	$\epsilon_{13} = 0.639$	$\epsilon_{14} = 0$	$\epsilon_{15} = 0$	$\epsilon_{16} = 0$	$\epsilon_{11} = 0$	$\epsilon_{21} = 0$	$\epsilon_{31} = 0$
$\epsilon_{21} = 0.639$	$\epsilon_{22} = 1.66$	$\epsilon_{23} = 0.639$	$\epsilon_{24} = 0$	$\epsilon_{25} = 0$	$\epsilon_{26} = 0$	$\epsilon_{12} = 0$	$\epsilon_{22} = 0$	$\epsilon_{32} = 0$
$\epsilon_{31} = 0.639$	$\epsilon_{32} = 0.639$	$\epsilon_{33} = 1.66$	$\epsilon_{34} = 0$	$\epsilon_{35} = 0$	$\epsilon_{36} = 0$	$\epsilon_{13} = 0$	$\epsilon_{23} = 0$	$\epsilon_{33} = 0$
$\epsilon_{41} = 0$	$\epsilon_{42} = 0$	$\epsilon_{43} = 0$	$\epsilon_{44} = 0.796$	$\epsilon_{45} = 0$	$\epsilon_{46} = 0$	$\epsilon_{14} = 0$	$\epsilon_{24} = 0$	$\epsilon_{34} = 0$
$\epsilon_{51} = 0$	$\epsilon_{52} = 0$	$\epsilon_{53} = 0$	$\epsilon_{54} = 0$	$\epsilon_{55} = 0.796$	$\epsilon_{56} = 0$	$\epsilon_{15} = 0$	$\epsilon_{25} = 0$	$\epsilon_{35} = 0$
$\epsilon_{61} = 0$	$\epsilon_{62} = 0$	$\epsilon_{63} = 0$	$\epsilon_{64} = 0$	$\epsilon_{65} = 0$	$\epsilon_{66} = 0.796$	$\epsilon_{16} = 0$	$\epsilon_{26} = 0$	$\epsilon_{36} = 0$
$\epsilon_{11}^S = 0$	$\epsilon_{12}^S = 0$	$\epsilon_{13}^S = 0$	$\epsilon_{14}^S = 0$	$\epsilon_{15}^S = 0$	$\epsilon_{16}^S = 0$	$\epsilon_{11}^S = 10.62$	$\epsilon_{12}^S = 0$	$\epsilon_{13}^S = 0$
$\epsilon_{21}^S = 0$	$\epsilon_{22}^S = 0$	$\epsilon_{23}^S = 0$	$\epsilon_{24}^S = 0$	$\epsilon_{25}^S = 0$	$\epsilon_{26}^S = 0$	$\epsilon_{21}^S = 0$	$\epsilon_{22}^S = 10.62$	$\epsilon_{23}^S = 0$
$\epsilon_{31}^S = 0$	$\epsilon_{32}^S = 0$	$\epsilon_{33}^S = 0$	$\epsilon_{34}^S = 0$	$\epsilon_{35}^S = 0$	$\epsilon_{36}^S = 0$	$\epsilon_{31}^S = 0$	$\epsilon_{32}^S = 0$	$\epsilon_{33}^S = 10.62$

$$\rho = 2.33 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material: Silicon

Crystal Group: m3m

References: (McSkimin, 53 ; Conwell, 52)

$c_{11} = 1.527$	$c_{12} = 0.869$	$c_{13} = 0.869$	$c_{14} = 0$	$c_{15} = 0$	$c_{16} = 0$
$c_{21} = 0.869$	$c_{22} = 1.527$	$c_{23} = 0.869$	$c_{24} = 0$	$c_{25} = 0$	$c_{26} = 0$
$c_{31} = 0.869$	$c_{32} = 0.869$	$c_{33} = 1.527$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$
$c_{41} = 0$	$c_{42} = 0$	$c_{43} = 0$	$c_{44} = 0.329$	$c_{45} = 0$	$c_{46} = 0$
$c_{51} = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 0.329$	$c_{56} = 0$
$c_{61} = 0$	$c_{62} = 0$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = 0$	$c_{66} = 0.329$

$$\rho = 10.5 \times 10^3 \text{ kg/m}^3$$

Elastic Constants (in 10^{11} N/m^2)

Material: Silver

Crystal Group: Isotropic

References: (Anderson, 65)

$c_{11}^E = 2.79$	$c_{12} = 1.53$	$c_{13} = 1.53$	$c_{14} = 0$	$c_{15} = 0$	$c_{16} = 0$	$e_{11} = 0$	$e_{21} = 0$	$e_{31} = 0$
$c_{21} = 1.53$	$c_{22} = 2.79$	$c_{23} = 1.53$	$c_{24} = 0$	$c_{25} = 0$	$c_{26} = 0$	$e_{12} = 0$	$e_{22} = 0$	$e_{32} = 0$
$c_{31} = 1.53$	$c_{32} = 1.53$	$c_{33} = 2.79$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$	$e_{13} = 0$	$e_{23} = 0$	$e_{33} = 0$
$c_{41} = 0$	$c_{42} = 0$	$c_{43} = 0$	$c_{44} = 1.53$	$c_{45} = 0$	$c_{46} = 0$	$e_{14} = 0$	$e_{24} = 0$	$e_{34} = 0$
$c_{51} = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 1.53$	$c_{56} = 0$	$e_{15} = 0$	$e_{25} = 0$	$e_{35} = 0$
$c_{61} = 0$	$c_{62} = 0$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = 0$	$c_{66} = 1.53$	$e_{16} = 0$	$e_{26} = 0$	$e_{36} = 0$
$e_{11} = 0$	$e_{12} = 0$	$e_{13} = 0$	$e_{14} = 0$	$e_{15} = 0$	$e_{16} = 0$	$\epsilon_{11}^S = 7.43$	$\epsilon_{12} = 0$	$\epsilon_{13} = 0$
$e_{21} = 0$	$e_{22} = 0$	$e_{23} = 0$	$e_{24} = 0$	$e_{25} = 0$	$e_{26} = 0$	$\epsilon_{21} = 0$	$\epsilon_{22} = 7.43$	$\epsilon_{23} = 0$
$e_{31} = 0$	$e_{32} = 0$	$e_{33} = 0$	$e_{34} = 0$	$e_{35} = 0$	$e_{36} = 0$	$\epsilon_{31} = 0$	$\epsilon_{32} = 0$	$\epsilon_{33} = 7.43$

$$\rho = 3.581 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material: Magnesium Aluminate Spinel ($\text{MgO} \cdot \text{Al}_2\text{O}_3$)

Crystal Group: Cubic

References: (Lewis, 66 ; Crystal Technology)

$c_{11}^E = 0.557$	$c_{12} = 0.512$	$c_{13} = 0.218$	$c_{14} = 0$	$c_{15} = 0$	$c_{16} = 0$	$e_{11} = 0$	$e_{21} = 0$	$e_{31} = 0$
$c_{21} = 0.512$	$c_{22} = 0.557$	$c_{23} = 0.218$	$c_{24} = 0$	$c_{25} = 0$	$c_{26} = 0$	$e_{12} = 0$	$e_{22} = 0$	$e_{32} = 0$
$c_{31} = 0.218$	$c_{32} = 0.218$	$c_{33} = 1.058$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$	$e_{13} = 0$	$e_{23} = 0$	$e_{33} = 0$
$c_{41} = 0$	$c_{42} = 0$	$c_{43} = 0$	$c_{44} = 0.265$	$c_{45} = 0$	$c_{46} = 0$	$e_{14} = 0.216$	$e_{24} = 0$	$e_{34} = 0$
$c_{51} = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 0.265$	$c_{56} = 0$	$e_{15} = 0$	$e_{25} = -0.216$	$e_{35} = 0$
$c_{61} = 0$	$c_{62} = 0$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = 0$	$c_{66} = 0.559$	$e_{16} = 0$	$e_{26} = 0$	$e_{36} = 0$
$e_{11} = 0$	$e_{12} = 0$	$e_{13} = 0$	$e_{14} = 0.216$	$e_{15} = 0$	$e_{16} = 0$	$\epsilon_{11}^S = 20.1$	$\epsilon_{12} = 0$	$\epsilon_{13} = 0$
$e_{21} = 0$	$e_{22} = 0$	$e_{23} = 0$	$e_{24} = 0$	$e_{25} = -0.216$	$e_{26} = 0$	$\epsilon_{21} = 0$	$\epsilon_{22} = 20.1$	$\epsilon_{23} = 0$
$e_{31} = 0$	$e_{32} = 0$	$e_{33} = 0$	$e_{34} = 0$	$e_{35} = 0$	$e_{36} = 0$	$\epsilon_{31} = 0$	$\epsilon_{32} = 0$	$\epsilon_{33} = 21.9$

$$\rho = 5.99 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material: TeO_2

Crystal Group: 422

References: (Olmachi & Uchida, 70)

$c_{11}^E = 3.34$	$c_{12}^E = 1.11$	$c_{13}^E = 1.11$	$c_{14}^E = 0$	$c_{15}^E = 0$	$c_{16}^E = 0$	$e_{11}^E = 0$	$e_{21}^E = 0$	$e_{31}^E = 0$
$c_{21}^E = 1.11$	$c_{22}^E = 3.34$	$c_{23}^E = 1.11$	$c_{24}^E = 0$	$c_{25}^E = 0$	$c_{26}^E = 0$	$e_{12}^E = 0$	$e_{22}^E = 0$	$e_{32}^E = 0$
$c_{31}^E = 1.11$	$c_{32}^E = 1.11$	$c_{33}^E = 3.34$	$c_{34}^E = 0$	$c_{35}^E = 0$	$c_{36}^E = 0$	$e_{13}^E = 0$	$e_{23}^E = 0$	$e_{33}^E = 0$
$c_{41}^E = 0$	$c_{42}^E = 0$	$c_{43}^E = 0$	$c_{44}^E = 1.15$	$c_{45}^E = 0$	$c_{46}^E = 0$	$e_{14}^E = 0$	$e_{24}^E = 0$	$e_{34}^E = 0$
$c_{51}^E = 0$	$c_{52}^E = 0$	$c_{53}^E = 0$	$c_{54}^E = 0$	$c_{55}^E = 1.15$	$c_{56}^E = 0$	$e_{15}^E = 0$	$e_{25}^E = 0$	$e_{35}^E = 0$
$c_{61}^E = 0$	$c_{62}^E = 0$	$c_{63}^E = 0$	$c_{64}^E = 0$	$c_{65}^E = 0$	$c_{66}^E = 1.15$	$e_{16}^E = 0$	$e_{26}^E = 0$	$e_{36}^E = 0$
$e_{11}^S = 0$	$e_{12}^S = 0$	$e_{13}^S = 0$	$e_{14}^S = 0$	$e_{15}^S = 0$	$e_{16}^S = 0$	$s_{11}^S = 10.35$	$e_{12}^S = 0$	$e_{13}^S = 0$
$e_{21}^S = 0$	$e_{22}^S = 0$	$e_{23}^S = 0$	$e_{24}^S = 0$	$e_{25}^S = 0$	$e_{26}^S = 0$	$e_{21}^S = 0$	$e_{22}^S = 10.35$	$e_{23}^S = 0$
$e_{31}^S = 0$	$e_{32}^S = 0$	$e_{33}^S = 0$	$e_{34}^S = 0$	$e_{35}^S = 0$	$e_{36}^S = 0$	$e_{31}^S = 0$	$e_{32}^S = 0$	$e_{33}^S = 10.35$

$$\rho = 4.55 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material: VAG

Crystal Group: Cubic

References: (Alton & Barlow, 67; Hurrell et al, 68)

$c_{11} = 2.903$	$c_{12} = 1.173$	$c_{13} = 1.173$	$c_{14} = 0$	$c_{15} = 0$	$c_{16} = 0$
$c_{21} = 1.173$	$c_{22} = 2.903$	$c_{23} = 1.173$	$c_{24} = 0$	$c_{25} = 0$	$c_{26} = 0$
$c_{31} = 1.173$	$c_{32} = 1.173$	$c_{33} = 2.903$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$
$c_{41} = 0$	$c_{42} = 0$	$c_{43} = 0$	$c_{44} = 0.955$	$c_{45} = 0$	$c_{46} = 0$
$c_{51} = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 0.955$	$c_{56} = 0$
$c_{61} = 0$	$c_{62} = 0$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = 0$	$c_{66} = 0.955$

$$\rho = 5.79 \times 10^3$$

Elastic Constants (in 10^{11} N/m^2)

Material: YGaG
 Crystal Group: Cubic
 References: (Bateman, 66)

$c_{11} = 2.69$	$c_{12} = 1.08$	$c_{13} = 1.08$	$c_{14} = 0$	$c_{15} = 0$	$c_{16} = 0$
$c_{21} = 1.08$	$c_{22} = 2.69$	$c_{23} = 1.08$	$c_{24} = 0$	$c_{25} = 0$	$c_{26} = 0$
$c_{31} = 1.08$	$c_{32} = 1.08$	$c_{33} = 2.69$	$c_{34} = 0$	$c_{35} = 0$	$c_{36} = 0$
$c_{41} = 0$	$c_{42} = 0$	$c_{43} = 0$	$c_{44} = 0.764$	$c_{45} = 0$	$c_{46} = 0$
$c_{51} = 0$	$c_{52} = 0$	$c_{53} = 0$	$c_{54} = 0$	$c_{55} = 0.764$	$c_{56} = 0$
$c_{61} = 0$	$c_{62} = 0$	$c_{63} = 0$	$c_{64} = 0$	$c_{65} = 0$	$c_{66} = 0.764$

$$\rho = 5.17 \times 10^3$$

Elastic Constants (in 10^{11} N/m^2)

Material: YIG

Crystal Group: Cubic $m\bar{3}m$

References: (Clark & Strakna, 61)

$\epsilon_{11}^p = 2.09$	$\epsilon_{12}^p = 1.205$	$\epsilon_{13}^p = 1.046$	$\epsilon_{14}^p = 0$	$\epsilon_{15}^p = 0$	$\epsilon_{16}^p = 0$	$\epsilon_{11}^d = 0$	$\epsilon_{21}^d = 0$	$\epsilon_{31}^d = -0.573$
$\epsilon_{21}^p = 1.205$	$\epsilon_{22}^p = 2.096$	$\epsilon_{23}^p = 1.046$	$\epsilon_{24}^p = 0$	$\epsilon_{25}^p = 0$	$\epsilon_{26}^p = 0$	$\epsilon_{12}^d = 0$	$\epsilon_{22}^d = 0$	$\epsilon_{32}^d = -0.573$
$\epsilon_{31}^p = 1.046$	$\epsilon_{32}^p = 1.046$	$\epsilon_{33}^p = 2.106$	$\epsilon_{34}^p = 0$	$\epsilon_{35}^p = 0$	$\epsilon_{36}^p = 0$	$\epsilon_{13}^d = 0$	$\epsilon_{23}^d = 0$	$\epsilon_{33}^d = 1.321$
$\epsilon_{41}^p = 0$	$\epsilon_{42}^p = 0$	$\epsilon_{43}^p = 0$	$\epsilon_{44}^p = 0.423$	$\epsilon_{45}^p = 0$	$\epsilon_{46}^p = 0$	$\epsilon_{14}^d = 0$	$\epsilon_{24}^d = -0.48$	$\epsilon_{34}^d = 0$
$\epsilon_{51}^p = 0$	$\epsilon_{52}^p = 0$	$\epsilon_{53}^p = 0$	$\epsilon_{54}^p = 0$	$\epsilon_{55}^p = 0.423$	$\epsilon_{56}^p = 0$	$\epsilon_{15}^d = -0.48$	$\epsilon_{25}^d = 0$	$\epsilon_{35}^d = 0$
$\epsilon_{61}^p = 0$	$\epsilon_{62}^p = 0$	$\epsilon_{63}^p = 0$	$\epsilon_{64}^p = 0$	$\epsilon_{65}^p = 0$	$\epsilon_{66}^p = 0.4455$	$\epsilon_{16}^d = 0$	$\epsilon_{26}^d = 0$	$\epsilon_{36}^d = 0$
$\epsilon_{11}^p = 0$	$\epsilon_{12}^p = 0$	$\epsilon_{13}^p = 0$	$\epsilon_{14}^p = 0$	$\epsilon_{15}^p = -0.48$	$\epsilon_{16}^p = 0$	$\epsilon_{11}^d = 7.57$	$\epsilon_{12}^d = 0$	$\epsilon_{13}^d = 0$
$\epsilon_{21}^p = 0$	$\epsilon_{22}^p = 0$	$\epsilon_{23}^p = 0$	$\epsilon_{24}^p = -0.48$	$\epsilon_{25}^p = 0$	$\epsilon_{26}^p = 0$	$\epsilon_{21}^d = 0$	$\epsilon_{22}^d = 7.57$	$\epsilon_{23}^d = 0$
$\epsilon_{31}^p = -0.573$	$\epsilon_{32}^p = -0.573$	$\epsilon_{33}^p = 1.321$	$\epsilon_{34}^p = 0$	$\epsilon_{35}^p = 0$	$\epsilon_{36}^p = 0$	$\epsilon_{31}^d = 0$	$\epsilon_{32}^d = 0$	$\epsilon_{33}^d = 9.03$

$$\rho = 5.665 \times 10^3 \text{ kg/m}^3$$

Elastic (in 10^{11} N/m^2), Dielectric (in 10^{-11} F/m), and Piezoelectric (in C/m^2) Matrices

Material: ZnO

Crystal Group: 6mm

References: (Smith, 69)

References

1. Elbaum, C. (1969) Ultrasonic attenuation in crystalline solids—intrinsic and extrinsic mechanisms, Ultrasonics: pp 113-116.
2. Oliver, D.W., and Slack, G.A. (1966) Ultrasonic attenuation in insulators at room temperature, J. Appl. Phys. 37:1542-1548.
3. Slobodnik, A. J., Jr., and O'Brien, J. V. (1971) Complete Theory of Acoustic Bulk Wave Propagation in Anisotropic Piezoelectric Media, TR-71-0601, AD 739162, National Technical Information Services, Springfield, Virginia 22151.
4. Cady, W.G. (1946) Piezoelectricity, McGraw-Hill, New York.
5. Waterman, P. C. (1959) Orientation dependence of elastic waves in single crystals, Phys. Rev. 113:1240-1253.
6. Farnell, G.W. (1961) Elastic waves in trigonal crystals, Can. J. Phys. 39:65-80.
7. Tiersten, H. F. (1963) Thickness vibrations of piezoelectric plates, J. Acoust. Soc. Am. 35:53-58.
8. Campbell, J. J., and Jones, W. R. (1968) A method for estimating optimal crystal cuts and propagation directions for excitation of piezoelectric surface waves, IEEE Trans. Sonics Ultrason. 15:209-217.
9. Goldstein, H. (1950) Classical Mechanics, Addison-Wesley, New York.
10. Slobodnik, A. J., Jr. (1967) Microwave Rectification Using Quartz, TR-67-0143, AD 655776, National Technical Information Services, Springfield, Virginia 22151.
11. Auld, B. A. (1973) Acoustic Fields and Waves in Solids, Wiley, New York.
12. Coquin, G. A., and Tiersten, H. F. (1967) Analysis of the excitation and detection of Piezoelectric surface waves in quartz by means of surface electrodes J. Acoust. Soc. Am. 41:921-939.
13. Slobodnik, A. J., Jr., Conway, E. D., and Delmonico, R. T. (1973) Micro-wave Acoustics Handbook, Volume 1A, Surface Wave Velocities, TR-73-0597, AD 780172, National Technical Information Services, Springfield, Virginia 22151.

Appendix A

"Rotated Constants" and Euler Angle Notation

The meaning of the "rotated constant" Euler angle notation can best be explained with reference to several examples.

Figure A1 illustrates the standard starting coordinate system in which the propagation axes line up with the crystalline axes X, Y and Z. Thus, one can follow how the standard Euler angle notation $0, 90, \theta$ refers to rotation in the XZ plane, starting with a propagation direction along the X axis and a plate normal along the -Y axis. This is the Y plane illustrated in Figure A2.

If, however, we first rotate through the Euler angles $45, 90, 35.264$ then the 1 axis, or propagation direction, is initially aligned with the $[111]$ crystalline axis and the 3 axis or plate normal would lie along the $[110]$ crystalline axis. This is illustrated in Figure A3 which also indicates how further rotations can then be accomplished from this starting point. The notation used in the text to describe this situation is illustrated in Figure A4.

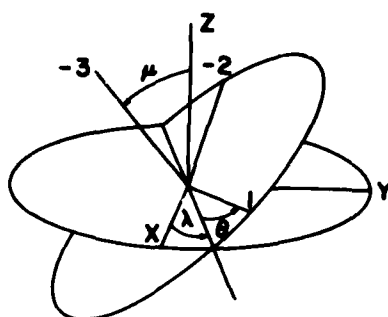
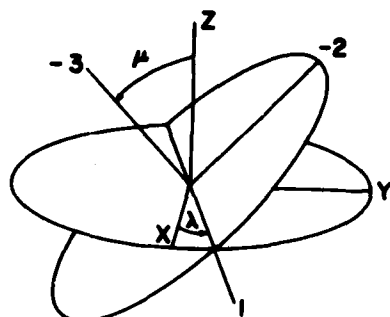
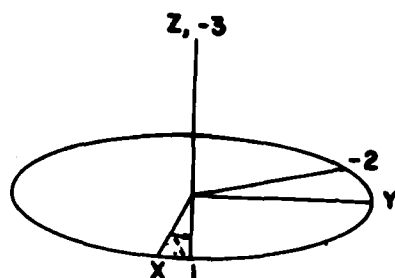


Figure A1. Coordinate System Used to Define Acoustic Wave Propagation. The phase velocity vector lies along the 1 axis. The crystalline axes are given by X, Y, and Z while the Euler angles are λ , μ and θ (After H. Goldstein in Classical Mechanics)

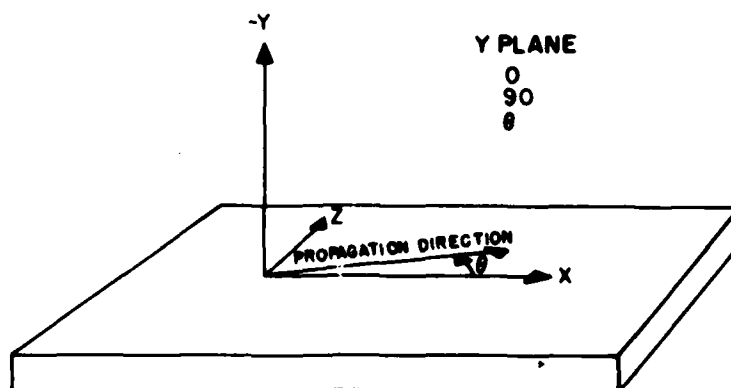


Figure A2. Standard Notation For a Y Plane. Rotation of μ through the angle of 90° aligns the plate normal with the $(-Y)$ crystalline axis while the propagation direction remains along the X axis. Further rotations in the plane of the plate are then accomplished through the angle θ

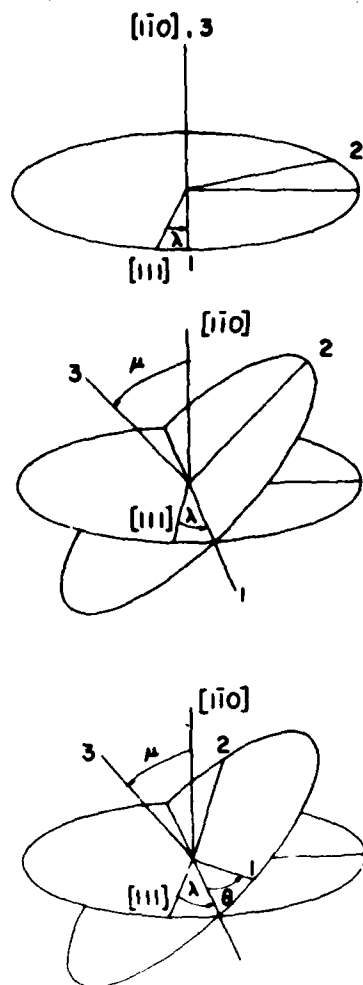


Figure A3. Coordinate System After Initial Rotation Through the Euler Angles 45, 90, 35.264. The phase velocity vector lies along the 1 axis while the plate normal lies along the negative 3 axis. The crystalline axes are given by $[111]$ and $[110]$. Euler angles for further rotations from this starting points are λ , μ and θ (After H. Goldstein in Classical Mechanics)

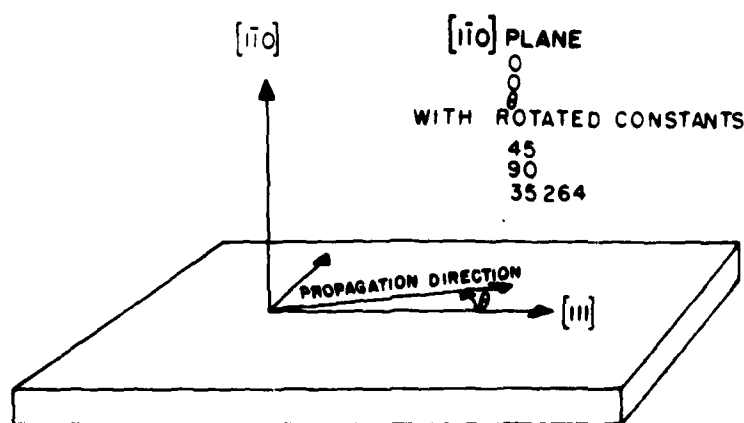


Figure A4. Standard Notation for a $[110]$ Plane. Initial rotation through the Euler angles 45, 90 35.264 aligns the propagation direction with the $[111]$ crystalline axis and the plate normal with the $[110]$ crystalline axis. Further rotations in the plane of the plate are then accomplished through the angle θ

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