

AD-A241 434



TECHNICAL REPORT CERC-91-15

2

US Army Corps  
of Engineers

# WAVE TRANSFORMATION OVER A GENERALIZED BEACH

Volume II

APPENDICES B THROUGH I

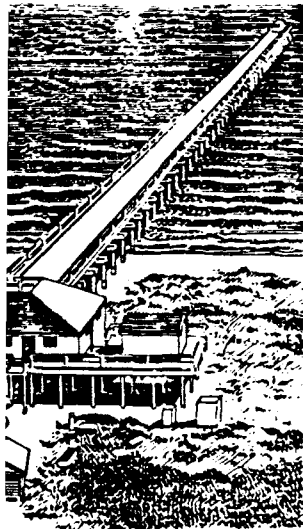
by

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DEPARTMENT OF THE ARMY

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September 1991

Final Report

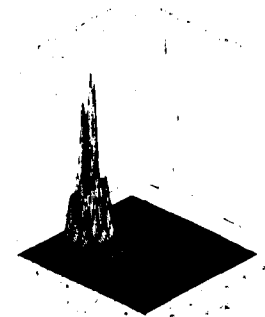
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91-12781

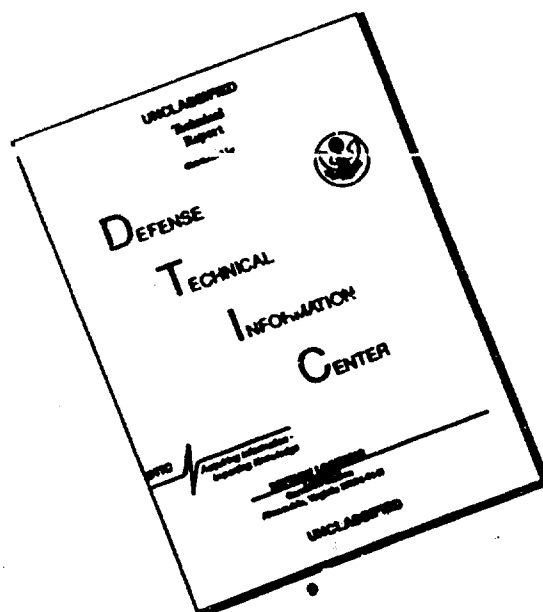


Prepared for DEPARTMENT OF THE ARMY  
US Army Corps of Engineers  
Washington, DC 20314-1000

Under Nearshore Waves and Currents Work Unit 31762  
Laboratory Simulation of Nearshore Waves Work Unit 31672  
Wave Estimation for Design Work Unit 31592



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APPENDIX B: TEST DURATION RESULTS

|               |   |
|---------------|---|
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| Off           |   |
| A-1           |   |



MEASURED WAVE PARAMETERS FOR 400 WAVE DURATION

(a) Periods (Sec)

| Test Case | OGA Gage Number |      |      |      |      |      | Ave. |
|-----------|-----------------|------|------|------|------|------|------|
|           | 1               | 2    | 3    | 4    | 5    | 6    |      |
| S01       | 2.46            | 2.46 | 2.32 | 2.46 | 2.46 | 2.32 | 2.41 |
| S09       | 2.63            | 2.24 | 2.34 | 2.49 | 2.49 | 2.29 | 2.41 |
| S13       | 2.48            | 2.36 | 2.48 | 2.36 | 2.36 | 2.48 | 2.42 |
| S21       | 2.33            | 2.46 | 2.48 | 2.46 | 2.46 | 2.39 | 2.43 |
| S25       | 2.49            | 2.49 | 2.34 | 2.49 | 2.50 | 2.49 | 2.47 |
| S33       | 2.53            | 2.40 | 2.40 | 2.39 | 2.39 | 2.57 | 2.45 |
| S37       | 1.21            | 1.21 | 1.32 | 1.32 | 1.21 | 1.19 | 1.24 |
| S45       | 1.16            | 1.23 | 1.22 | 1.23 | 1.27 | 1.18 | 1.21 |
| S49       | 1.19            | 1.20 | 1.24 | 1.24 | 1.24 | 1.24 | 1.23 |
| S57       | 1.25            | 1.19 | 1.22 | 1.24 | 1.24 | 1.27 | 1.23 |
| S61       | 1.29            | 1.17 | 1.17 | 1.17 | 1.17 | 1.17 | 1.19 |
| S69       | 1.24            | 1.21 | 1.19 | 1.30 | 1.19 | 1.24 | 1.23 |

(b) Heights (Ft)

| Test Case | OGA Gage Number |      |      |      |      |      | Ave. |
|-----------|-----------------|------|------|------|------|------|------|
|           | 1               | 2    | 3    | 4    | 5    | 6    |      |
| S01       | 0.45            | 0.38 | 0.40 | 0.42 | 0.39 | 0.43 | 0.41 |
| S09       | 0.43            | 0.41 | 0.40 | 0.41 | 0.40 | 0.38 | 0.41 |
| S13       | 0.44            | 0.41 | 0.42 | 0.36 | 0.37 | 0.43 | 0.40 |
| S21       | 0.42            | 0.40 | 0.39 | 0.40 | 0.40 | 0.39 | 0.40 |
| S25       | 0.39            | 0.39 | 0.35 | 0.38 | 0.39 | 0.38 | 0.38 |
| S33       | 0.40            | 0.38 | 0.40 | 0.37 | 0.37 | 0.37 | 0.38 |
| S37       | 0.30            | 0.31 | 0.32 | 0.33 | 0.32 | 0.30 | 0.31 |
| S45       | 0.43            | 0.45 | 0.45 | 0.45 | 0.43 | 0.43 | 0.44 |
| S49       | 0.45            | 0.43 | 0.43 | 0.41 | 0.42 | 0.41 | 0.43 |
| S57       | 0.41            | 0.39 | 0.40 | 0.41 | 0.41 | 0.39 | 0.40 |
| S61       | 0.35            | 0.36 | 0.34 | 0.38 | 0.38 | 0.39 | 0.36 |
| S69       | 0.40            | 0.38 | 0.40 | 0.39 | 0.39 | 0.38 | 0.39 |

# MEASURED WAVE PARAMETERS FOR 200 WAVE DURATION

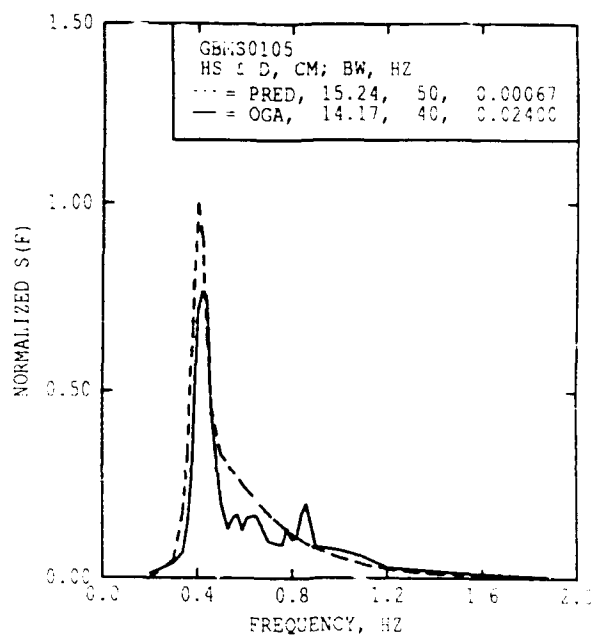
## (a) Periods (Sec)

| Test Case | OGA Gage Number |      |      |      |      |      | Ave. |
|-----------|-----------------|------|------|------|------|------|------|
|           | 1               | 2    | 3    | 4    | 5    | 6    |      |
| S01       | 2.30            | 2.30 | 2.30 | 2.30 | 2.30 | 2.30 | 2.30 |
| S09       | 2.38            | 2.33 | 2.28 | 2.33 | 2.33 | 2.45 | 2.35 |
| S13       | 2.33            | 2.33 | 2.55 | 2.33 | 2.33 | 2.55 | 2.40 |
| S21       | 2.46            | 2.32 | 2.33 | 2.50 | 2.42 | 2.42 | 2.41 |
| S25       | 2.35            | 2.35 | 2.35 | 2.55 | 2.55 | 2.35 | 2.42 |
| S33       | 2.51            | 2.20 | 2.25 | 2.36 | 2.42 | 2.56 | 2.38 |
| S37       | 1.28            | 1.28 | 1.30 | 1.30 | 1.24 | 1.18 | 1.26 |
| S45       | 1.21            | 1.20 | 1.23 | 1.24 | 1.27 | 1.20 | 1.23 |
| S49       | 1.19            | 1.19 | 1.24 | 1.29 | 1.24 | 1.24 | 1.23 |
| S57       | 1.21            | 1.23 | 1.20 | 1.24 | 1.26 | 1.29 | 1.24 |
| S61       | 1.20            | 1.23 | 1.20 | 1.20 | 1.23 | 1.20 | 1.21 |
| S69       | 1.28            | 1.19 | 1.26 | 1.17 | 1.28 | 1.26 | 1.24 |

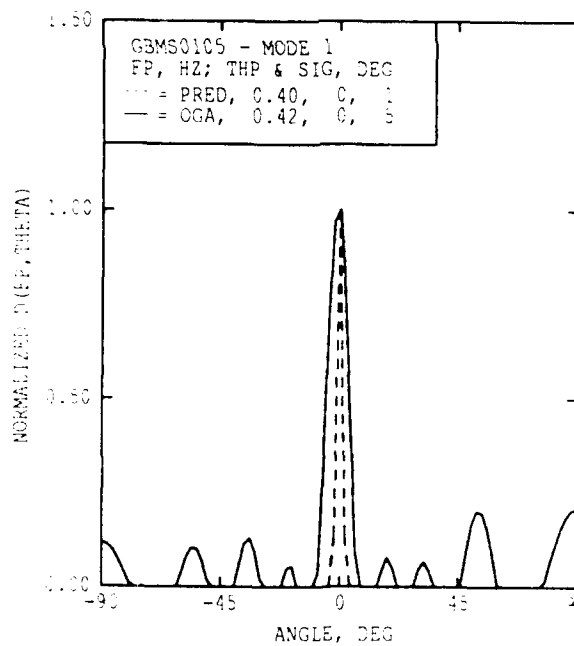
## (b) Heights (Ft)

| Test Case | OGA Gage Number |      |      |      |      |      | Ave. |
|-----------|-----------------|------|------|------|------|------|------|
|           | 1               | 2    | 3    | 4    | 5    | 6    |      |
| S01       | 0.44            | 0.37 | 0.39 | 0.40 | 0.38 | 0.41 | 0.40 |
| S09       | 0.43            | 0.41 | 0.41 | 0.42 | 0.41 | 0.38 | 0.41 |
| S13       | 0.42            | 0.38 | 0.40 | 0.35 | 0.34 | 0.40 | 0.38 |
| S21       | 0.41            | 0.41 | 0.41 | 0.39 | 0.40 | 0.41 | 0.40 |
| S25       | 0.39            | 0.39 | 0.36 | 0.37 | 0.39 | 0.38 | 0.38 |
| S33       | 0.40            | 0.39 | 0.41 | 0.36 | 0.35 | 0.37 | 0.38 |
| S37       | 0.29            | 0.30 | 0.30 | 0.32 | 0.30 | 0.29 | 0.30 |
| S45       | 0.42            | 0.46 | 0.47 | 0.44 | 0.42 | 0.42 | 0.44 |
| S49       | 0.43            | 0.43 | 0.42 | 0.40 | 0.41 | 0.40 | 0.42 |
| S57       | 0.39            | 0.40 | 0.39 | 0.41 | 0.40 | 0.38 | 0.40 |
| S61       | 0.35            | 0.36 | 0.33 | 0.38 | 0.38 | 0.39 | 0.36 |
| S69       | 0.40            | 0.37 | 0.40 | 0.40 | 0.38 | 0.38 | 0.39 |

APPENDIX C: MEASURED VERSUS PREDICTED DIRECTIONAL SPECTRA

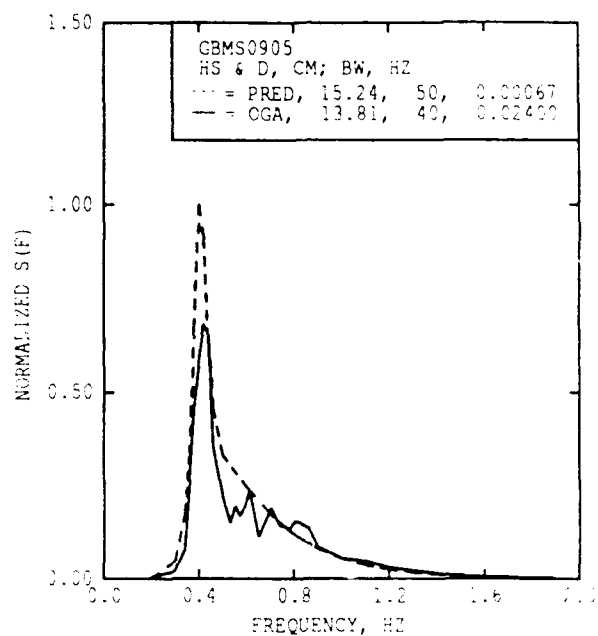


A) PRED. VS. OGA FREQUENCY SPECTRA  
GAGE CODE = B

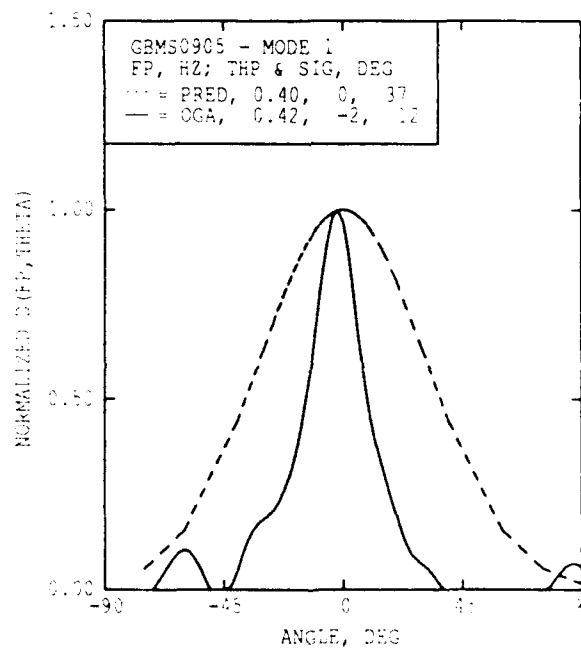


B) PRED. VS. OGA SPREADING & PEAK FREQ  
GAGE CODE = B

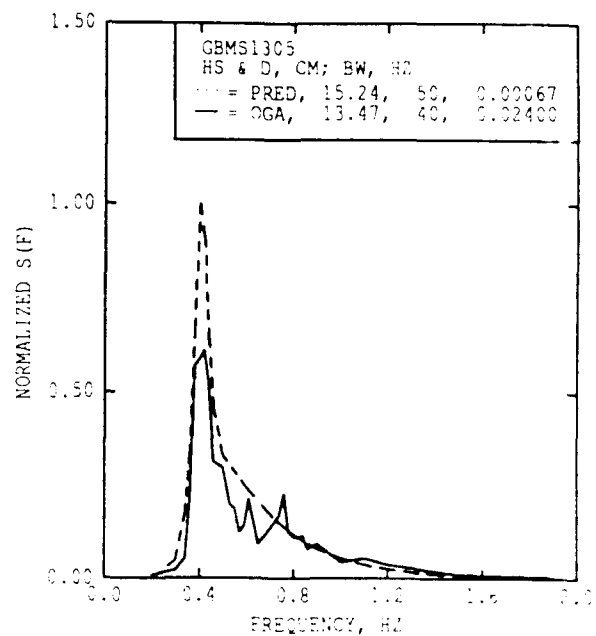




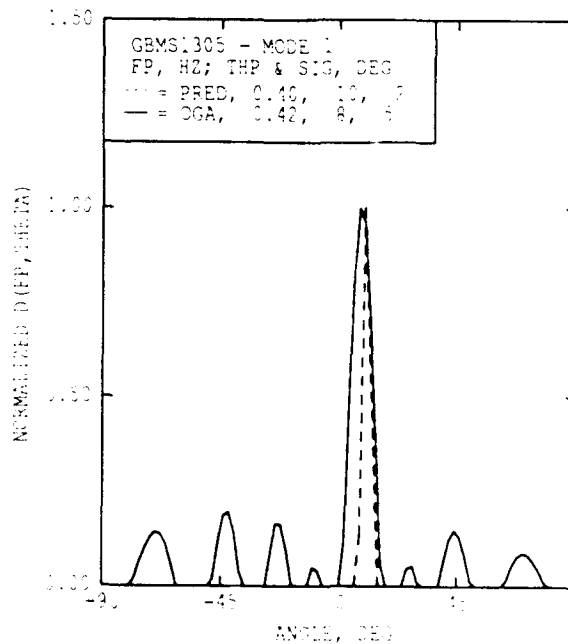
A) PRED. VS. OGA FREQUENCY SPECTRA  
GAGE CODE = A



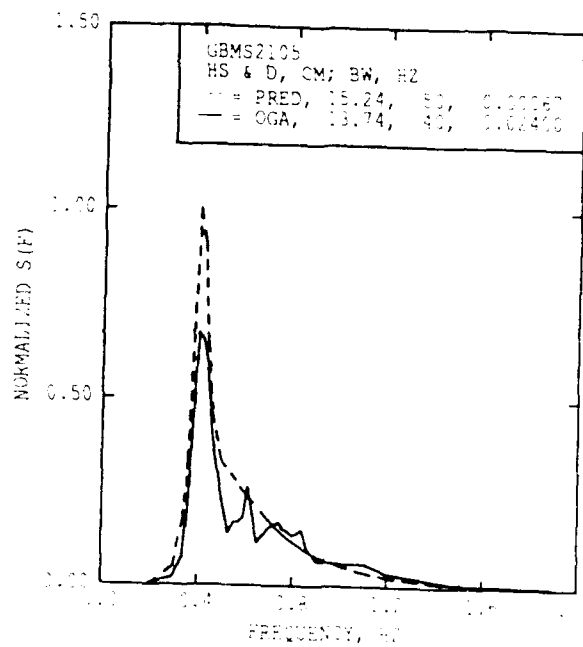
B) PRED. VS. OGA SPREADING & PEAK ANG.  
GAGE CODE = A



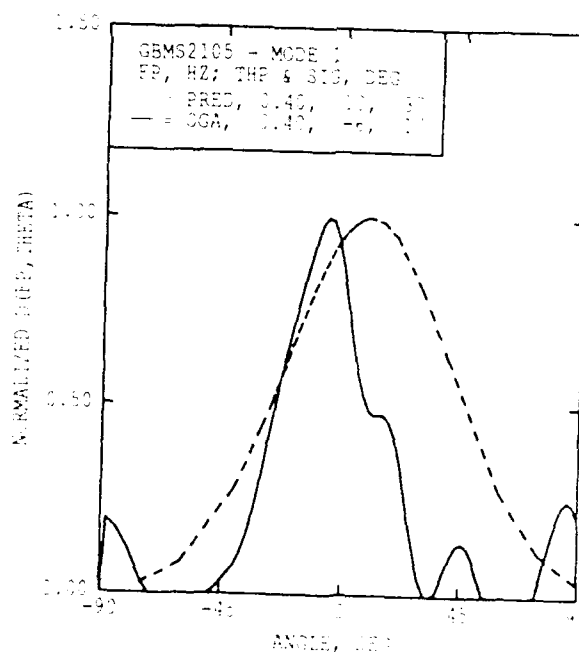
A) PRED. VS. OGA FREQUENCY SPECTRA  
PAGE CODE = B



B) PRED. VS. OGA DISSIPATION ANGLE  
PAGE CODE = B



AP PRED. VS. OGA FREQUENCY (BTHRA  
MODE 1) - A



FP PRED. VS. OGA DEPRATING 0.1000 THP,  
DATA FILE 1

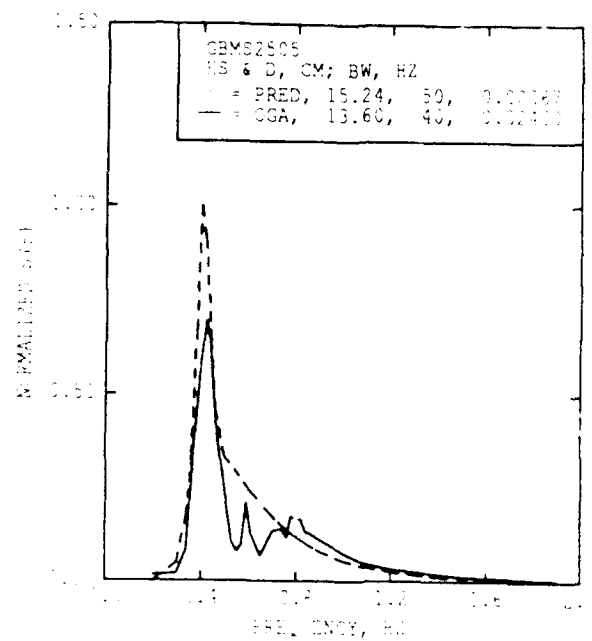


FIGURE 1. PRED. AND CGA FREQUENCY SPECTRA  
CASE 105 - B

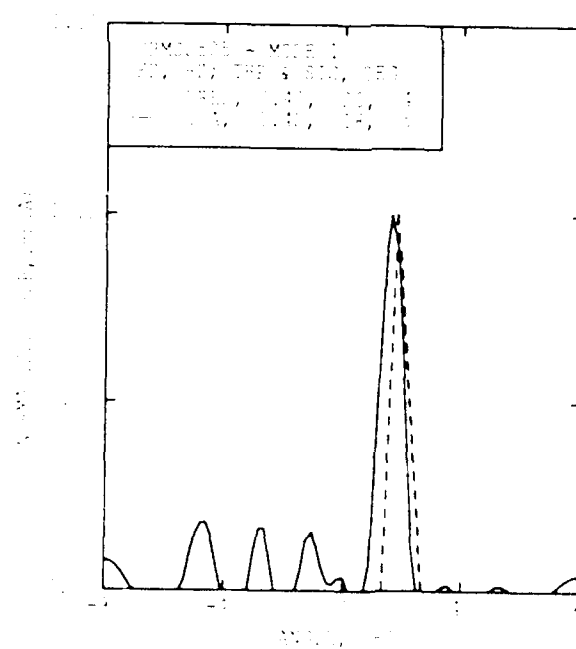
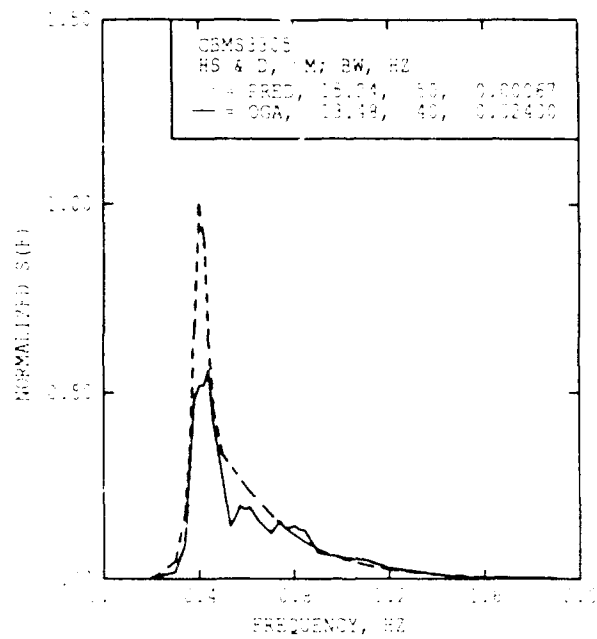
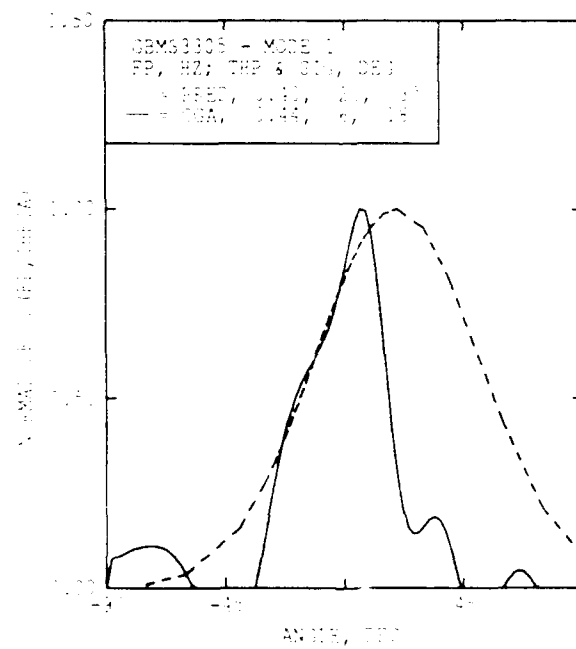


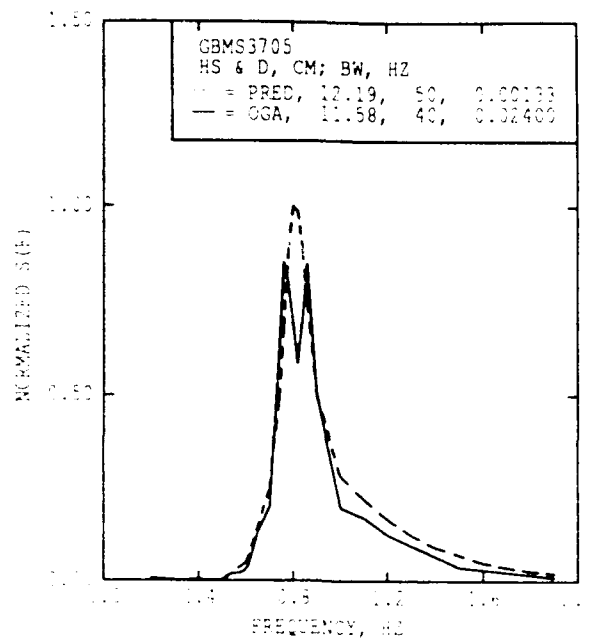
FIGURE 2. PRED. AND CGA FREQUENCY SPECTRA  
CASE 105 - C



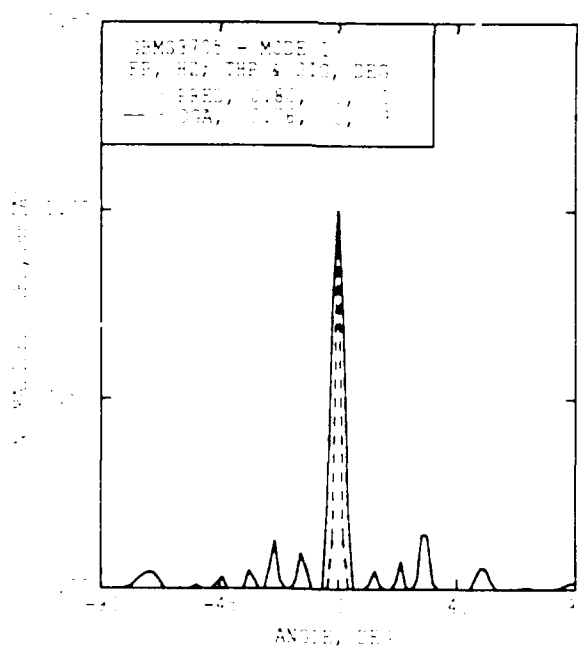
A. CREL. V. OGA FREQUENCY OFFESA  
NAME 1105



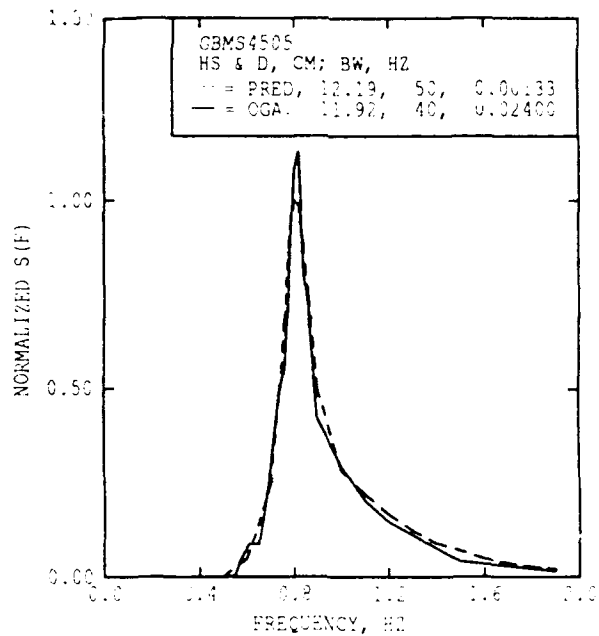
B. CREL. V. OGA VARIATION - 1105 FREQ.  
NAME 1105



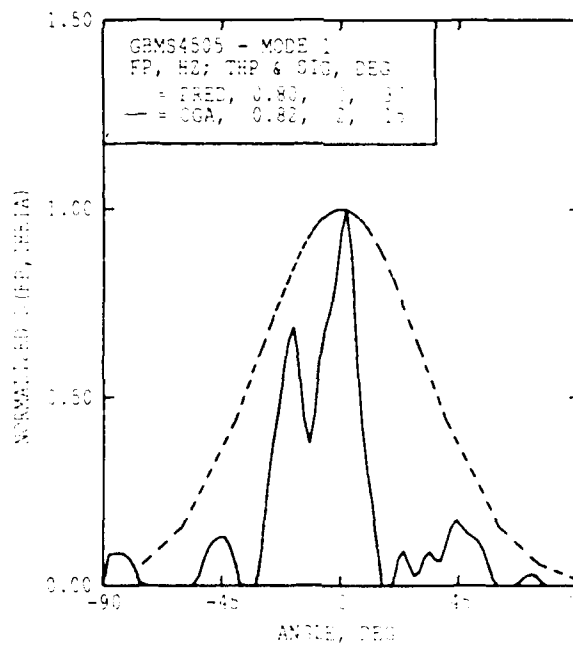
APR 1982, VOL. 10A FREQUENCY TYPICAL  
DATE 1982-08



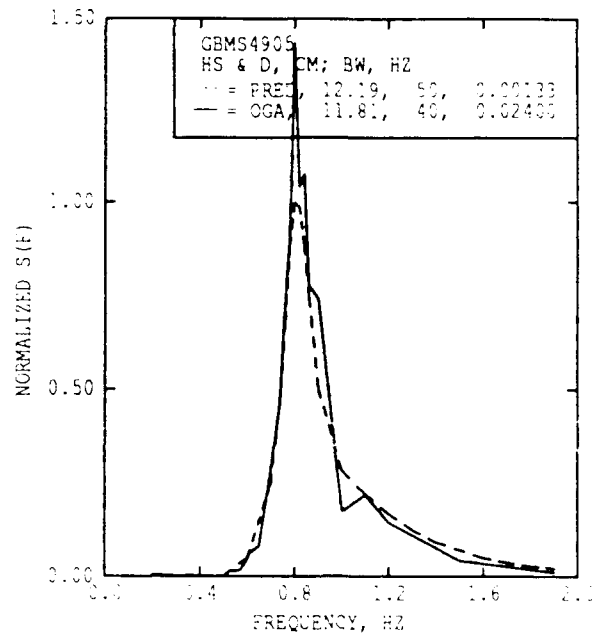
APR 1982, VOL. 10A TYPICAL \* PEAK FREQ.  
DATE 1982-08



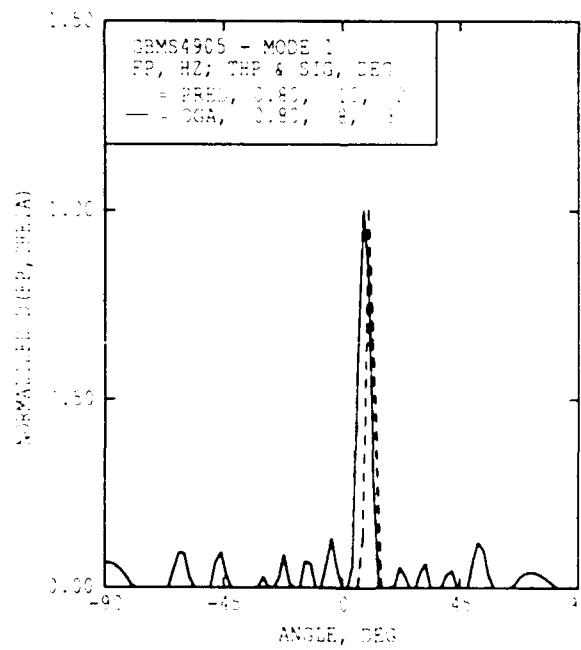
A) PRED. VS. OGA FREQUENCY SPECTRA  
GAGE CODE = C



B) PRED. VS. OGA ORIENTATION - TRAP PRED  
GAGE CODE = C

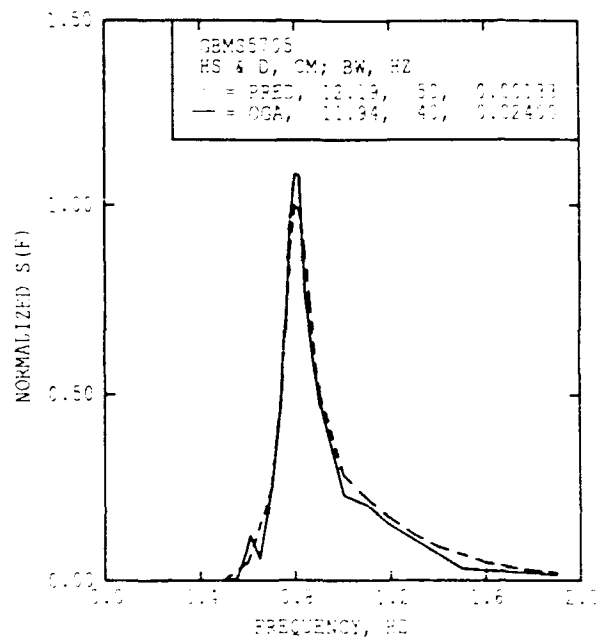


A) PRED. VS. OGA FREQUENCY SPECTRA  
BASE CODE - B

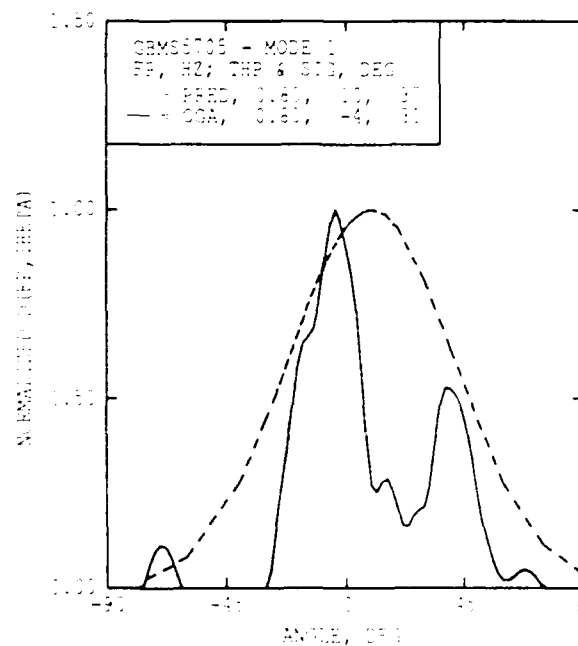


B) PRED. VS. OGA SPREADING & BEAM EFF.  
BASE CODE - B

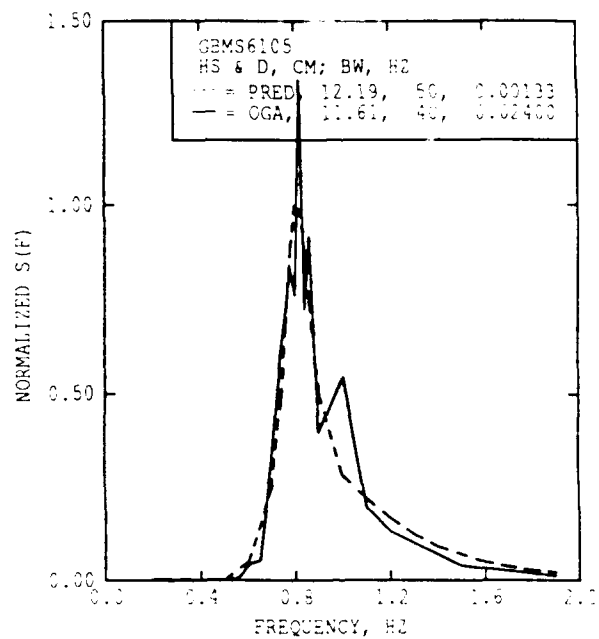




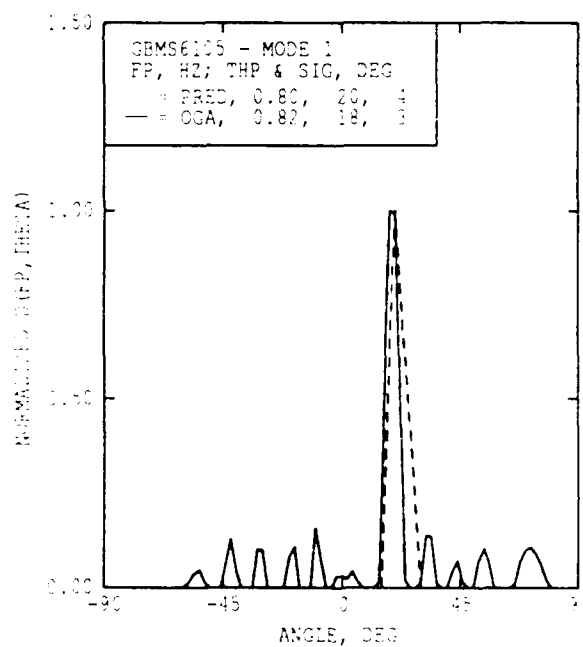
A PRED. VS. DOA FREQUENCY SPECTRA  
CASE CODE = 7



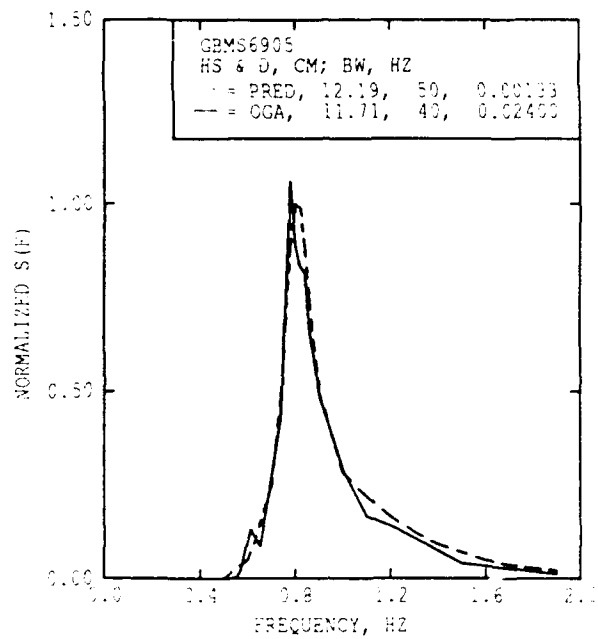
B PRED. VS. DOA PROPAGATION BEAM PATTERN  
CASE CODE = 7



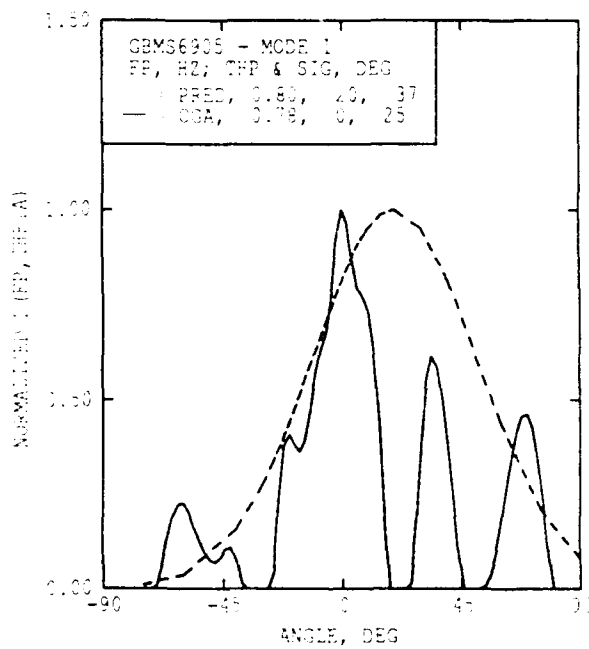
A) PRED. VS. OGA FREQUENCY SPECTRA  
PAGE CODE + B



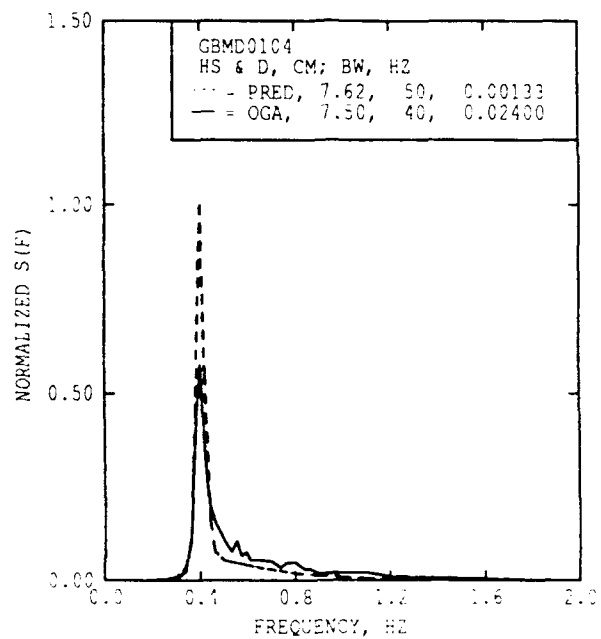
B) PRED. VS. OGA SPREADING BEAM PPL.  
PAGE CODE + B



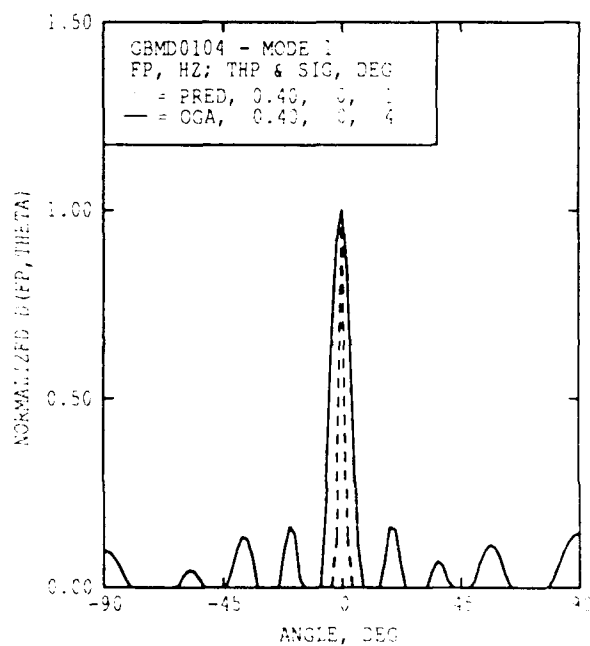
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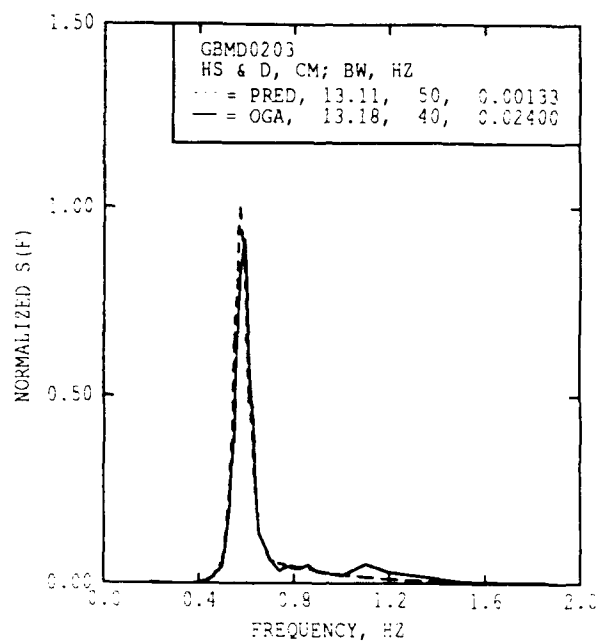
B) PRED. VS. OGA SPREADING 3 PEAK PRED  
GAGE CODE = A



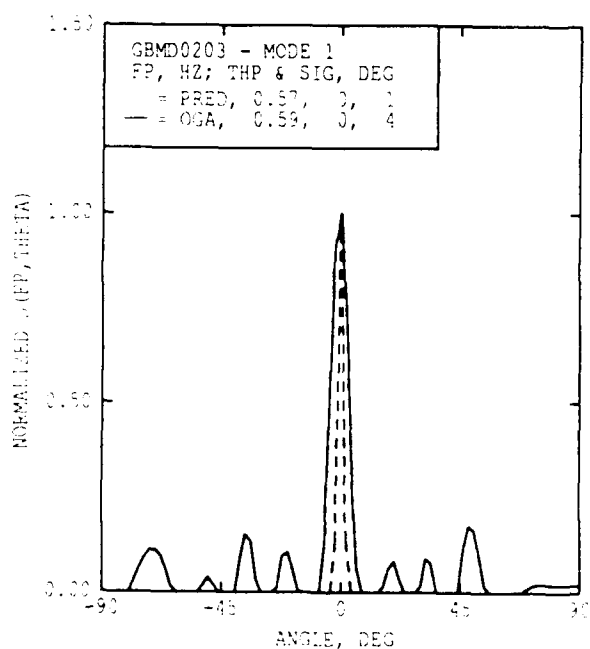
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GAGE CODE = B



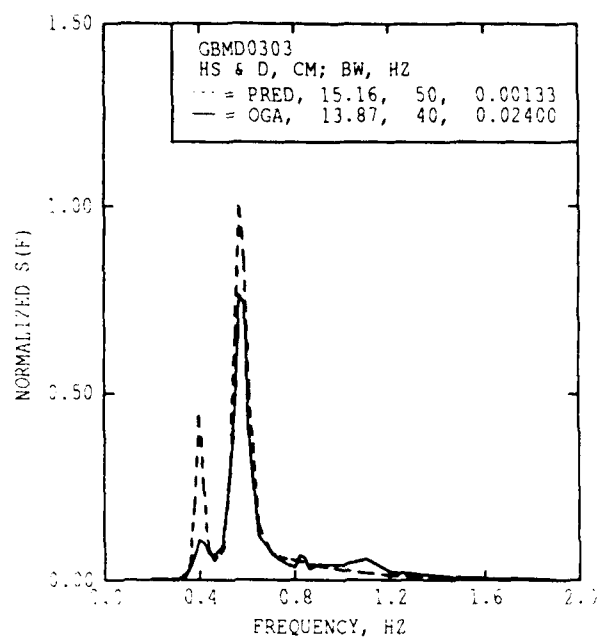
B) PRED. VS. OGA SPREADING & PEAK PRED.  
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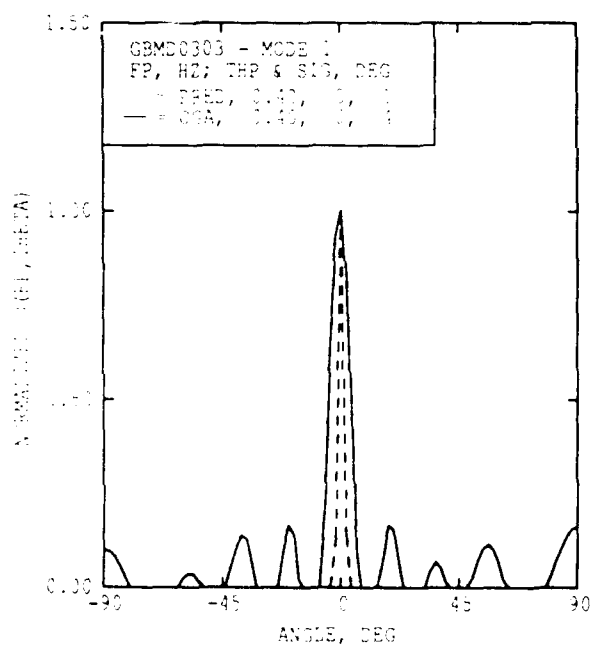
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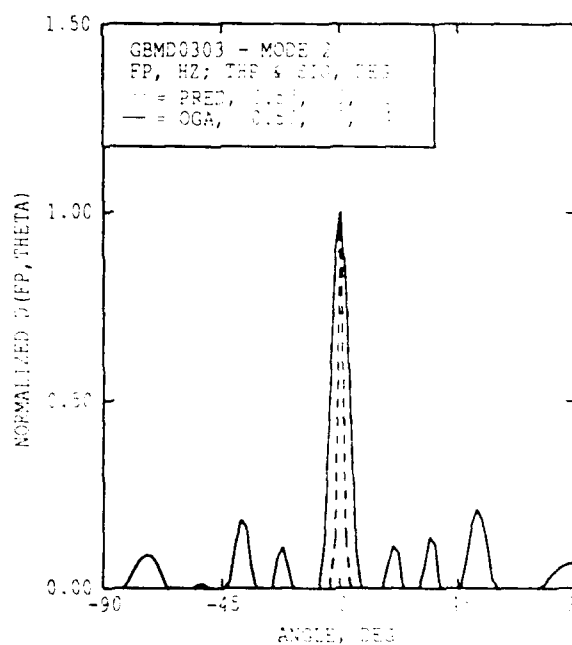
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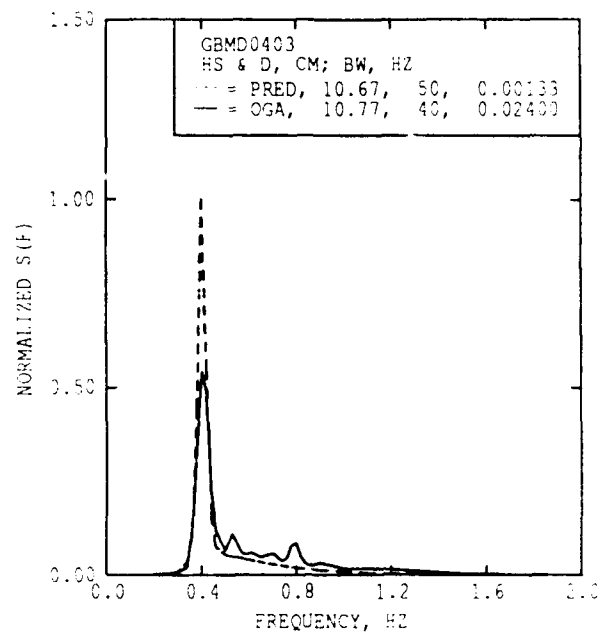
A) PRED. VS. OGA FREQUENCY SPECTRA  
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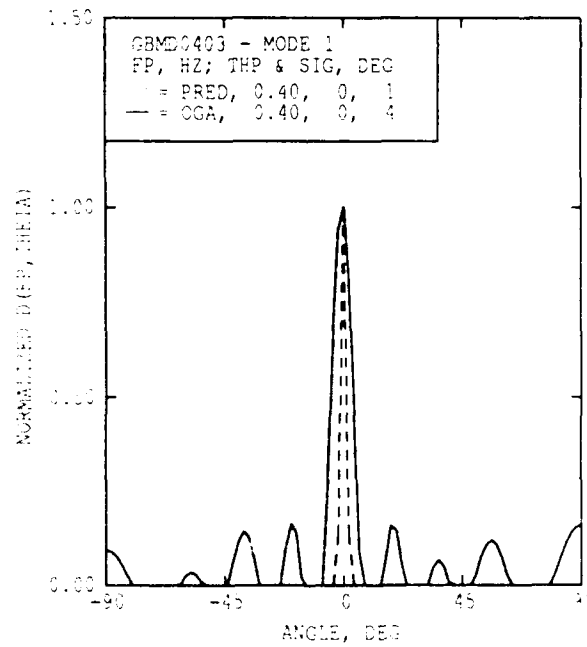
B) PRED. VS. OGA SPREADING & PEAK FREQ  
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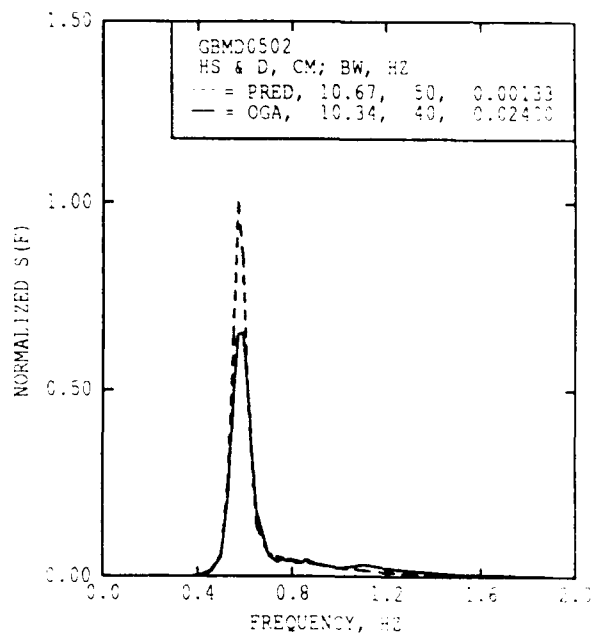
C) PRED. VS. OGA SPREADING & PEAK FREQ  
PAGE CODE = B



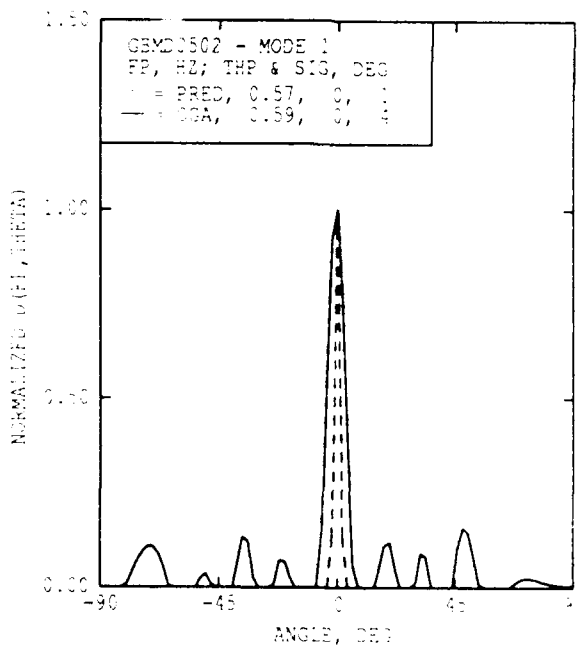
A) PRED. VS. OGA FREQUENCY SPECTRA  
GAGE CODE = B



B) PRED. VS. OGA SPREADING & BEAM FWHM  
GAGE CODE = B

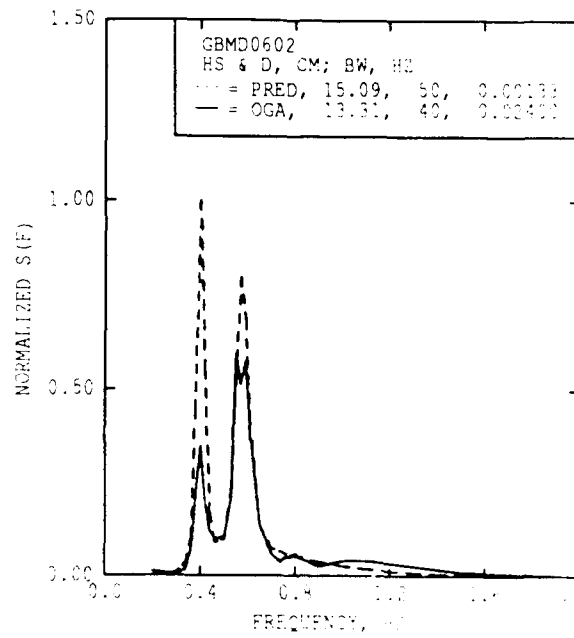


A) PRED. VS. CGA FREQUENCY SPECTRA  
CASE CODE = B

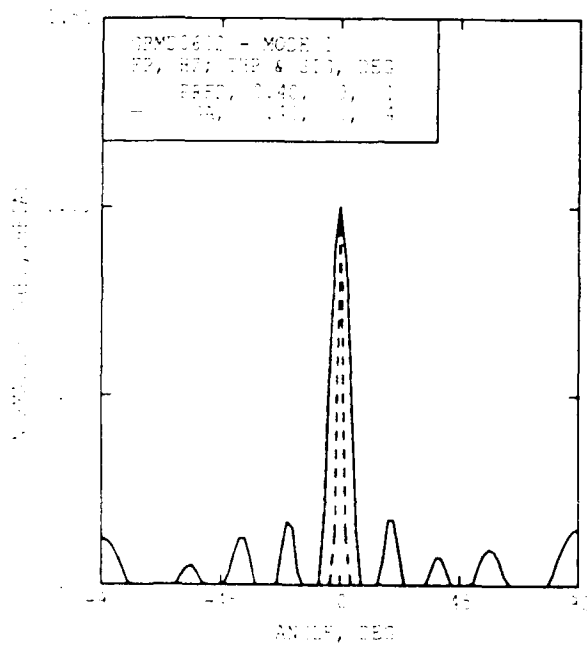


B) PRED. VS. CGA SPREADING & PEAK RAD.  
CASE CODE = B

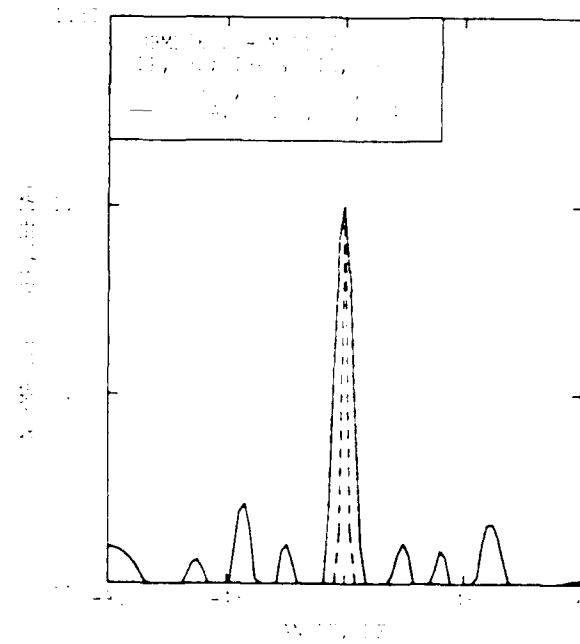




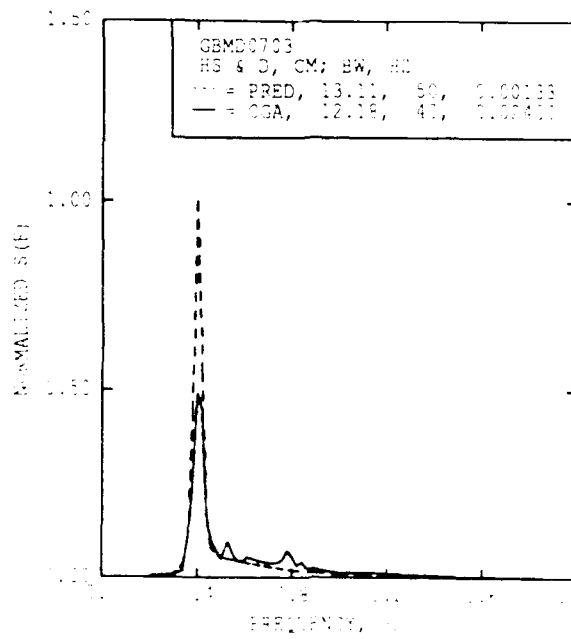
A. PRED. VS. OGA FREQUENCY RESPONSE  
PAGE 0008 OF 08



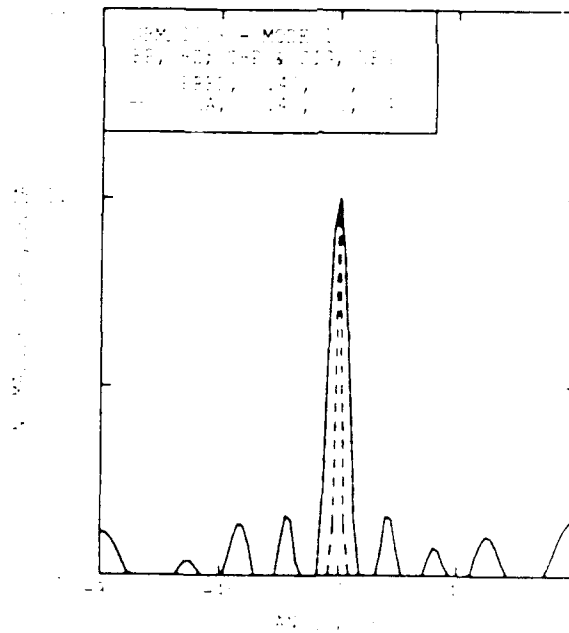
A. PRED. VS. OGA FREQUENCY RESPONSE  
PAGE 0009 OF 08



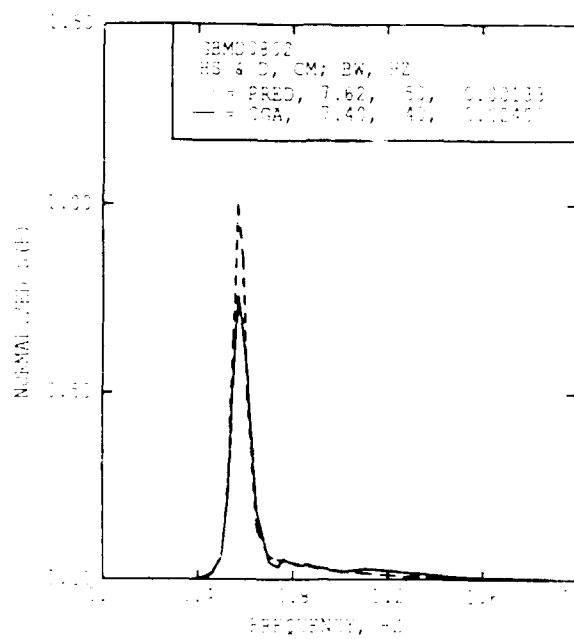
A. PRED. VS. OGA FREQUENCY RESPONSE  
PAGE 0010 OF 08



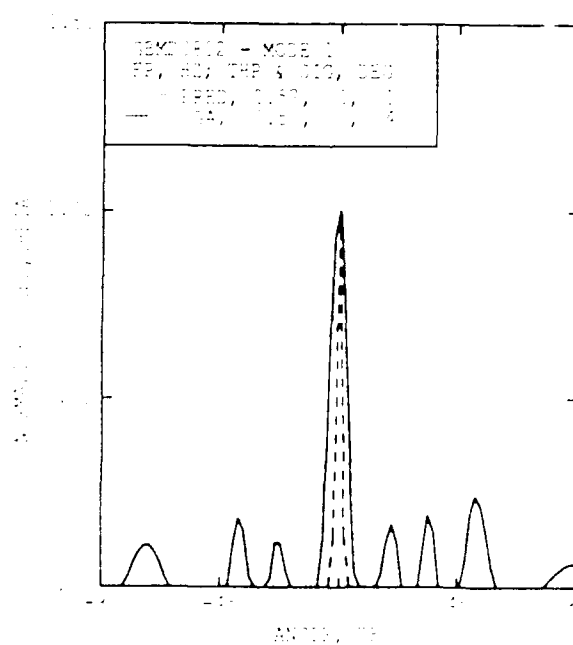
ANALYSIS OF THE DATA FROM THE  
 ANALYSIS OF THE DATA FROM THE



ANALYSIS OF THE DATA FROM THE  
 ANALYSIS OF THE DATA FROM THE



A PRED. VS. GGA FREQUENCY SPECTRA  
GGA, 7.40 HZ



A PRED. VS. GGA AMPLITUDE SPECTRA  
GGA, 1.20 V

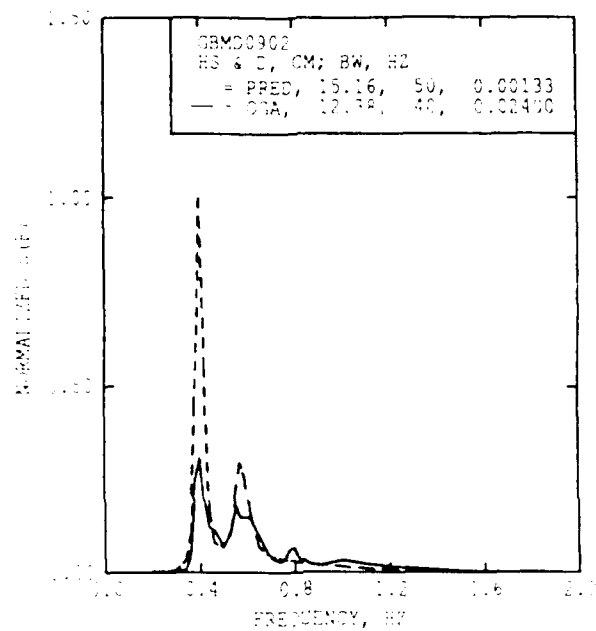


FIGURE 1. FREQUENCY SPECTRA  
 (PREDICTED VS. OBSERVED)

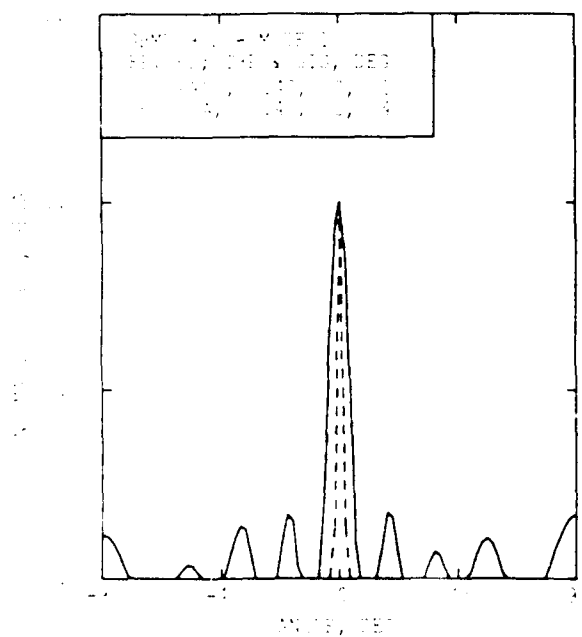


FIGURE 2. ANGLE SPECTRA  
 (PREDICTED VS. OBSERVED)

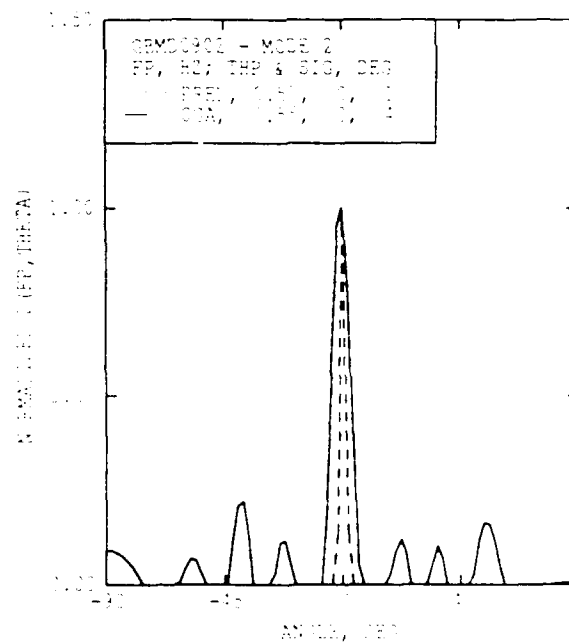
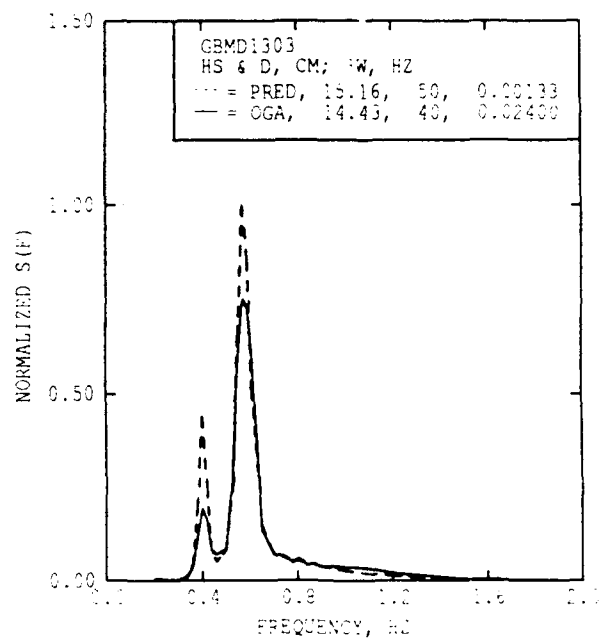
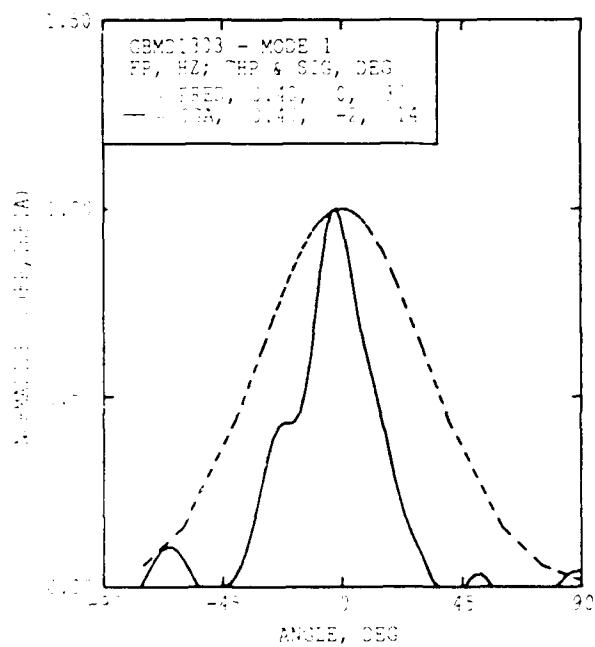


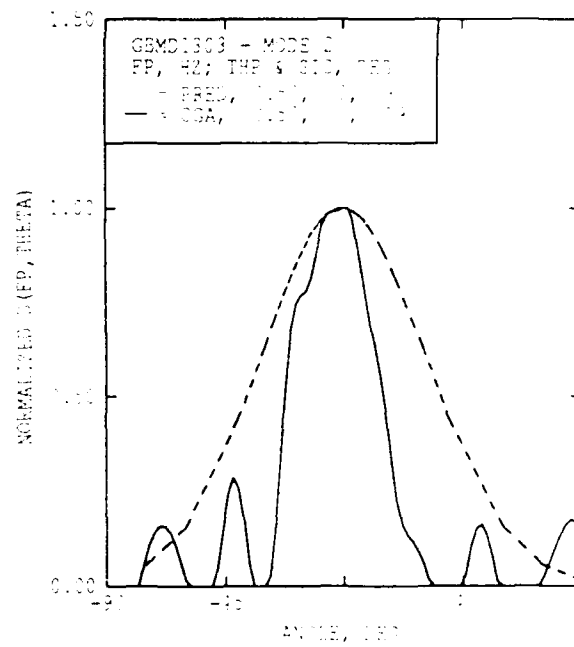
FIGURE 3. ANGLE SPECTRA  
 (PREDICTED VS. OBSERVED)



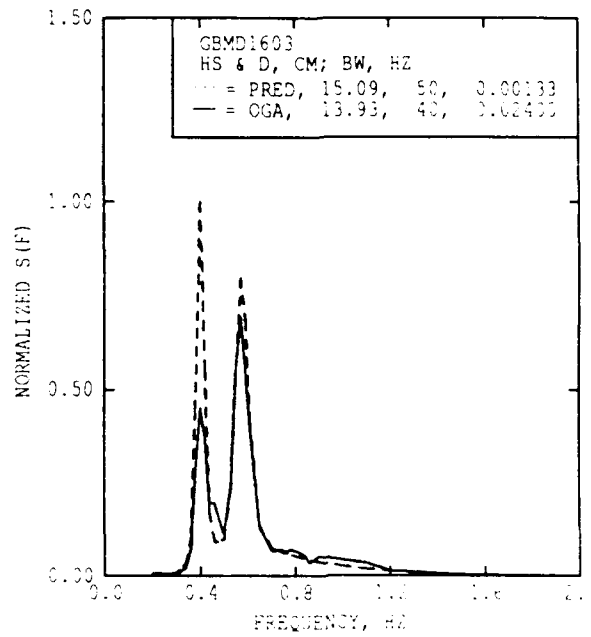
A) PRED. VS. OGA FREQUENCY SPECTRA  
 GAGE CODE = A



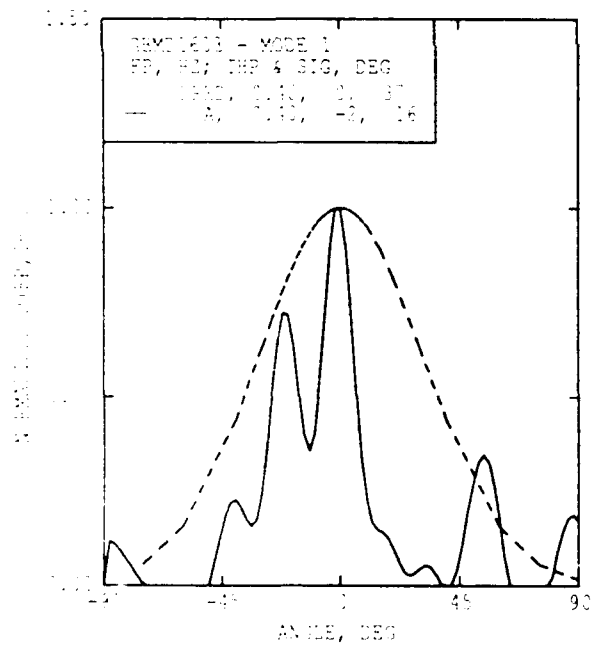
B) PRED. VS. OGA BEAM SPREADING P-PEAK FREQ  
 GAGE CODE = A



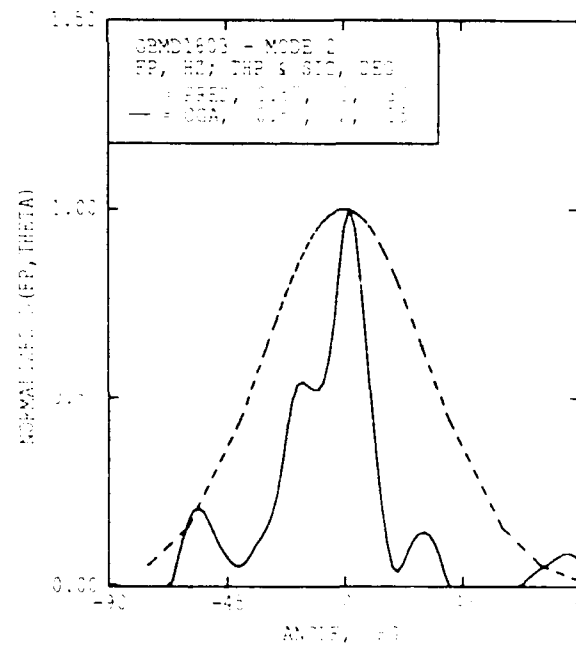
C) PRED. VS. OGA BEAM SPREADING S-PEAK FREQ  
 GAGE CODE = A



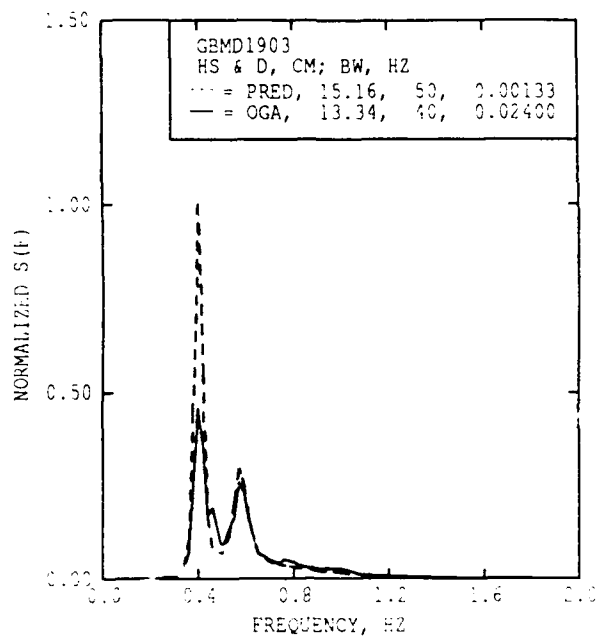
A) PRED. VS. OGA FREQUENCY SPECTRA  
GAGE CODE = A



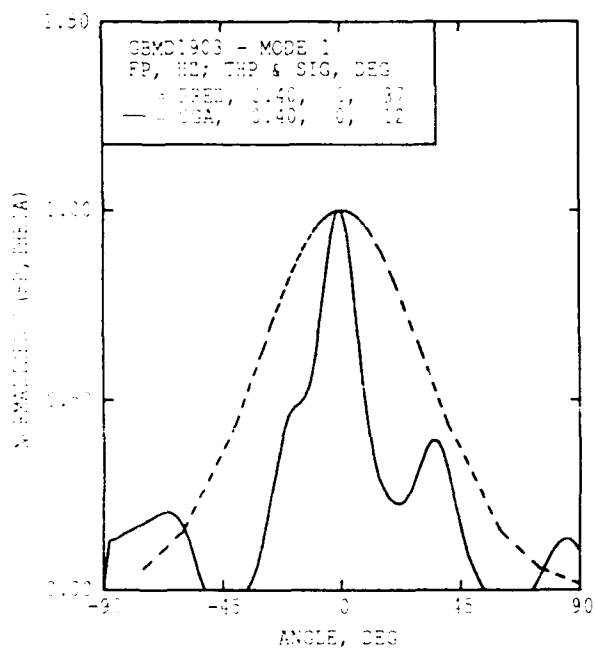
B) PRED. VS. OGA SPREADING & PEAK FREQ  
GAGE CODE = A



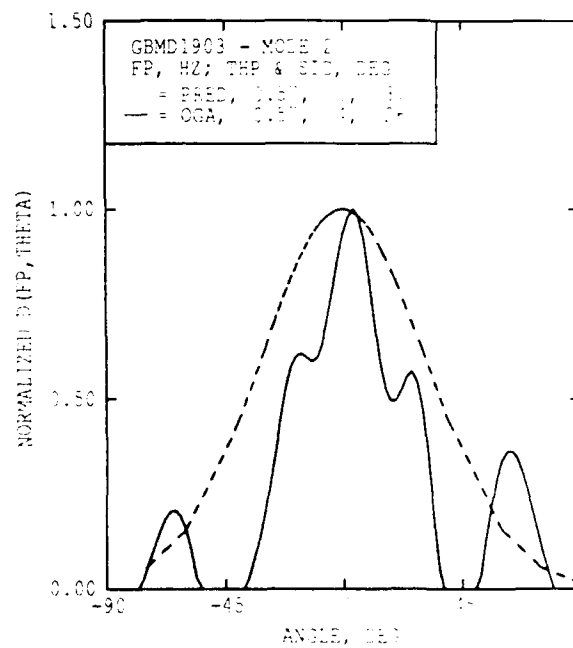
C) PRED. VS. OGA SPREADING & PEAK FREQ  
GAGE CODE = A



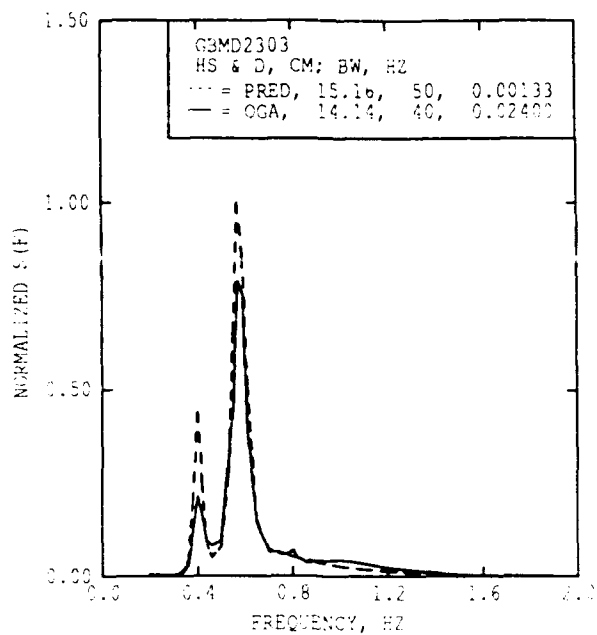
A: PRED. VS. OGA FREQUENCY SPECTRA  
GAGE CODE = C



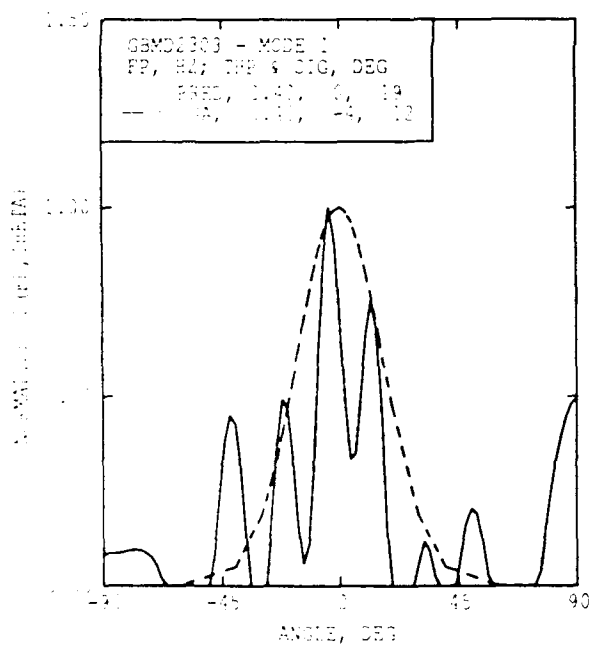
B: PRED. VS. OGA DIRECTIVITY PATTERN  
GAGE CODE = C



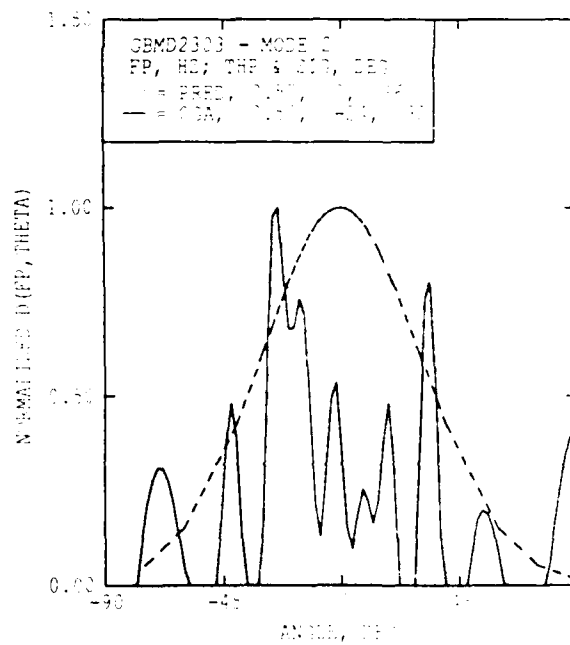
C: PRED. VS. OGA DIRECTIVITY PATTERN  
GAGE CODE = C



A) PRED. VS. OGA FREQUENCY SPECTRA  
PAGE CODE = B

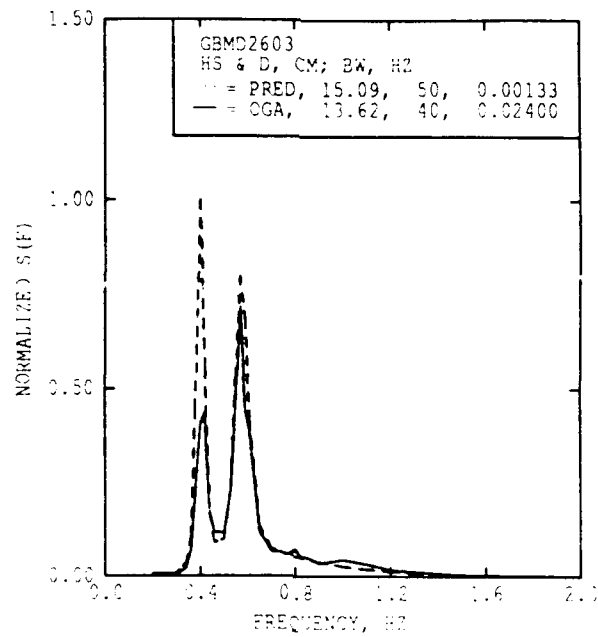


B) PRED. VS. OGA SPREADING 3 PEAK FREQ  
PAGE CODE = B

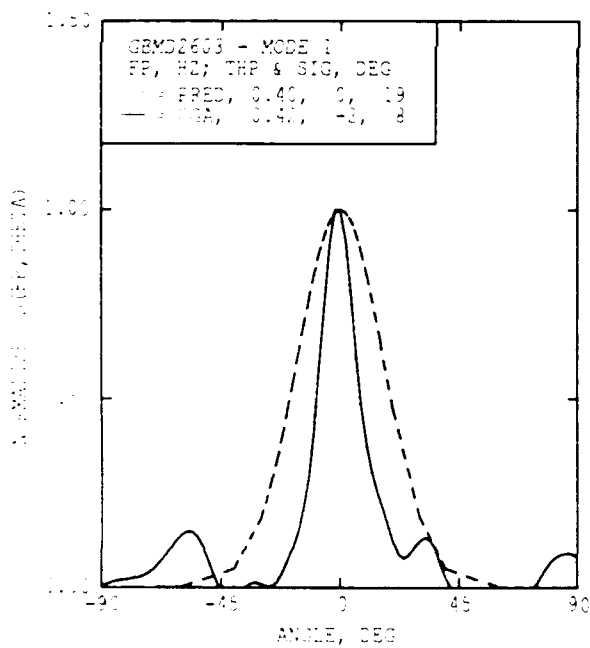


C) PRED. VS. OGA SPREADING 3 PEAK FREQ  
PAGE CODE = B

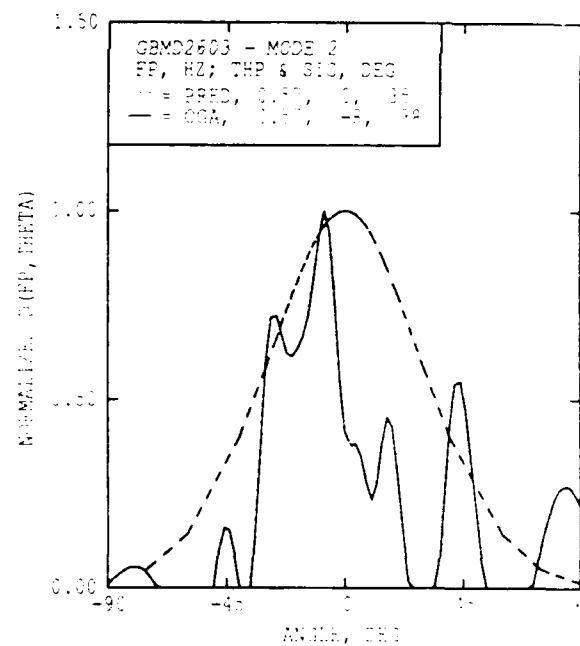




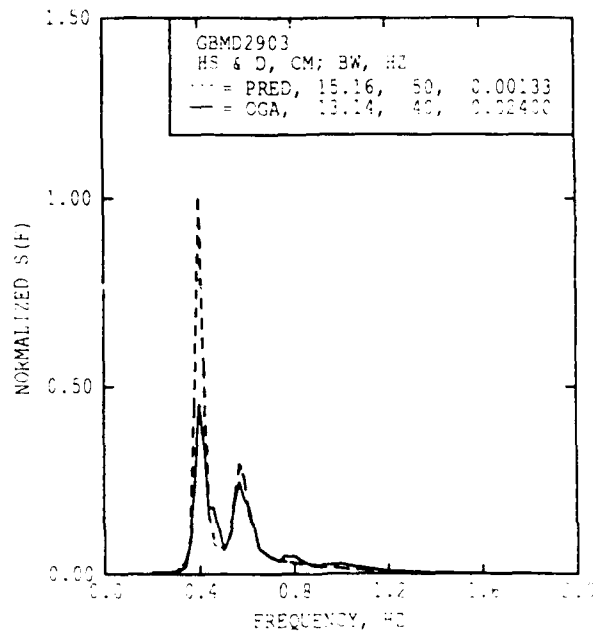
A) PRED. VS. OGA FREQUENCY SPECTRA  
PAGE CODE = 0



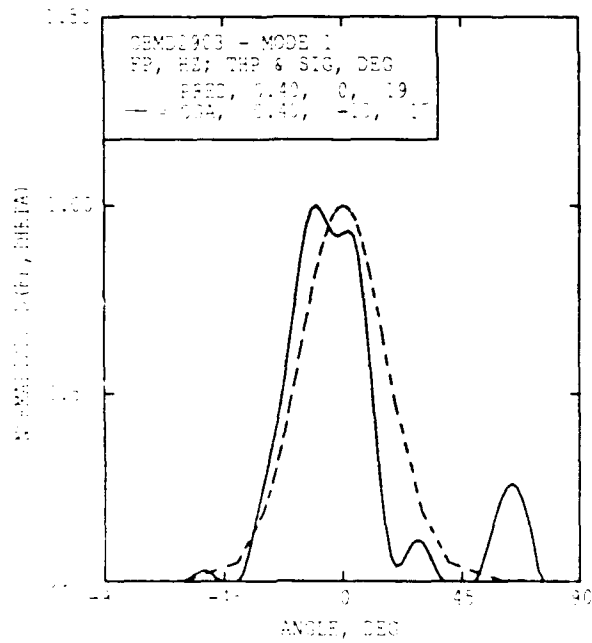
B) PRED. VS. OGA DIFFRACTION PEAK PRED.  
PAGE CODE = 0



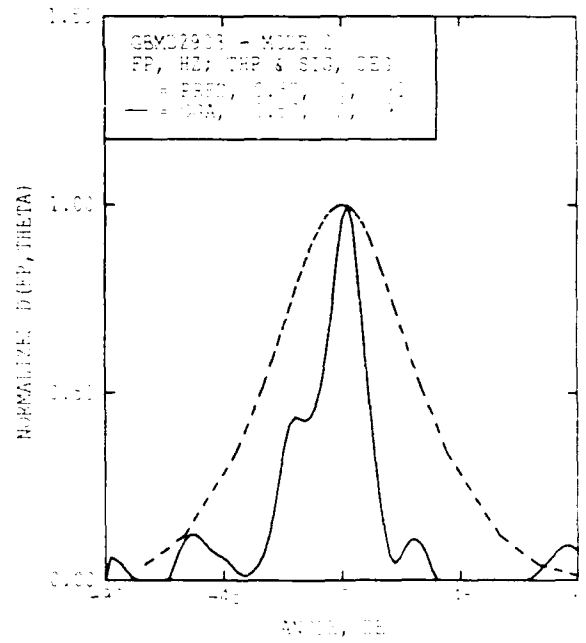
C) PRED. VS. OGA DIFFRACTION PEAK PRED.  
PAGE CODE = 0



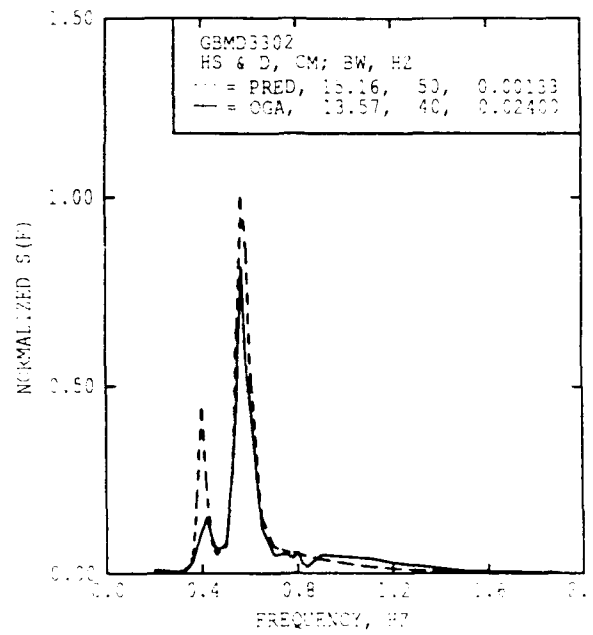
A) PRED. VS. CGA FREQUENCY RESPONSE  
CASE CCDF = A



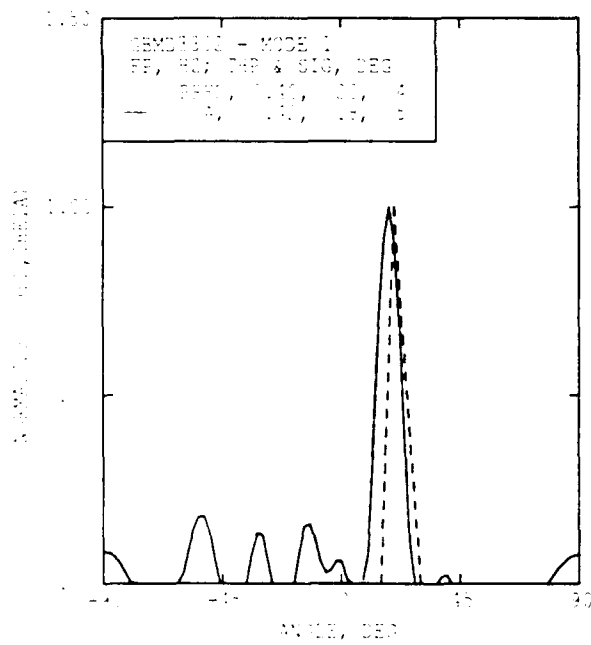
B) PRED. VS. CGA SPREADING & PEAK FREQ  
CASE CCDF = A



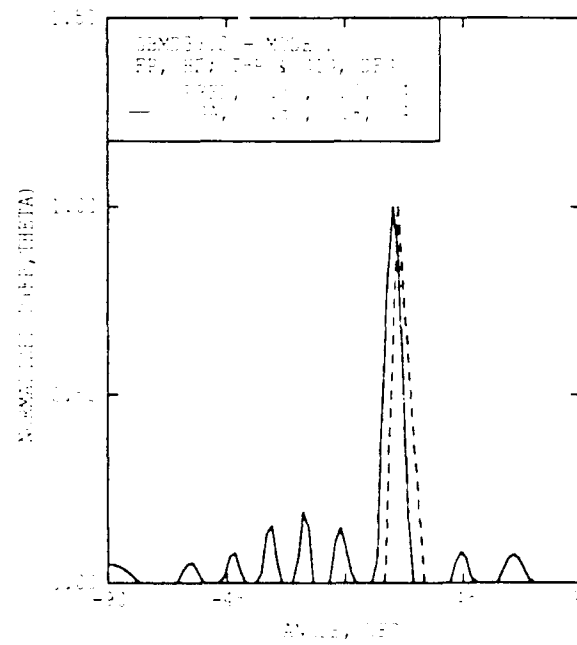
C) PRED. VS. CGA SPREADING & PEAK FREQ  
CASE CCDF = A



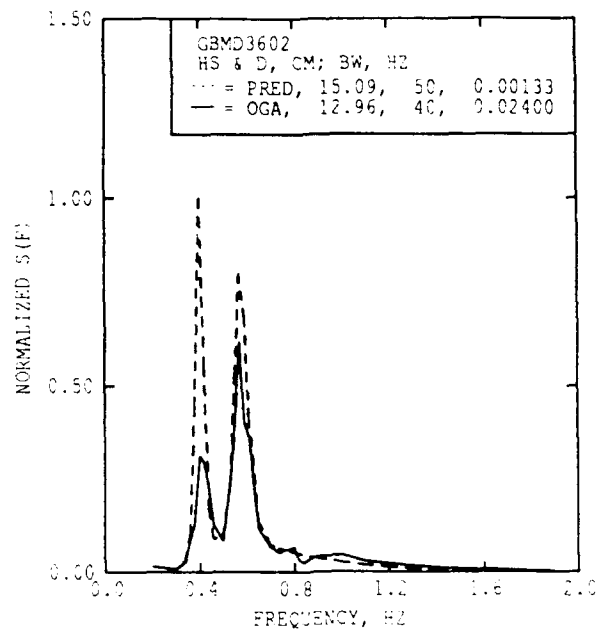
AS PRED. VS. OGA FREQUENCY SPECTRA  
PAGE CODE = B



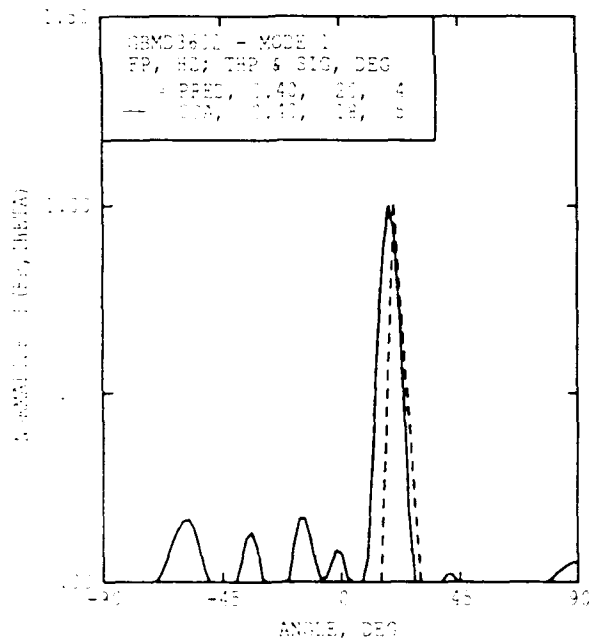
AS PRED. VS. OGA ANGLE SPECTRA  
PAGE CODE = B



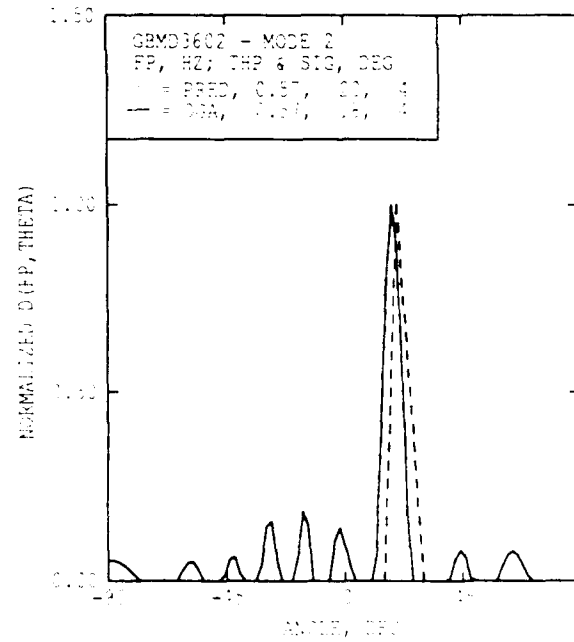
AS PRED. VS. OGA ANGLE SPECTRA  
PAGE CODE = B



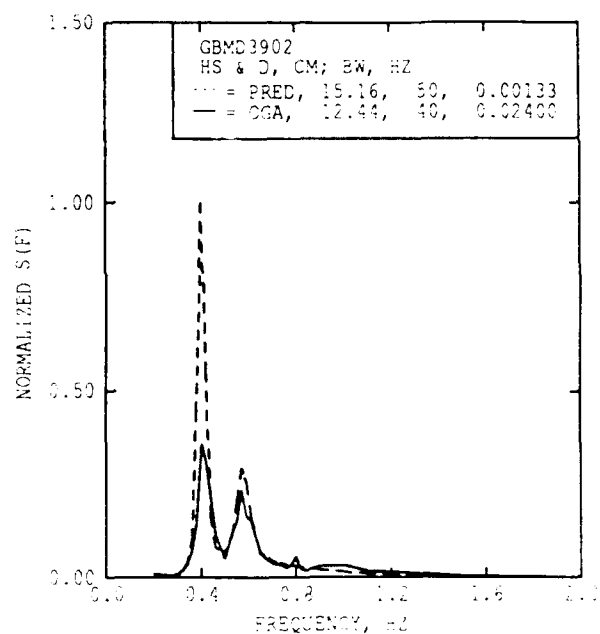
A) PRED. VS. OGA FREQUENCY SPECTRA  
DATE CODE = B



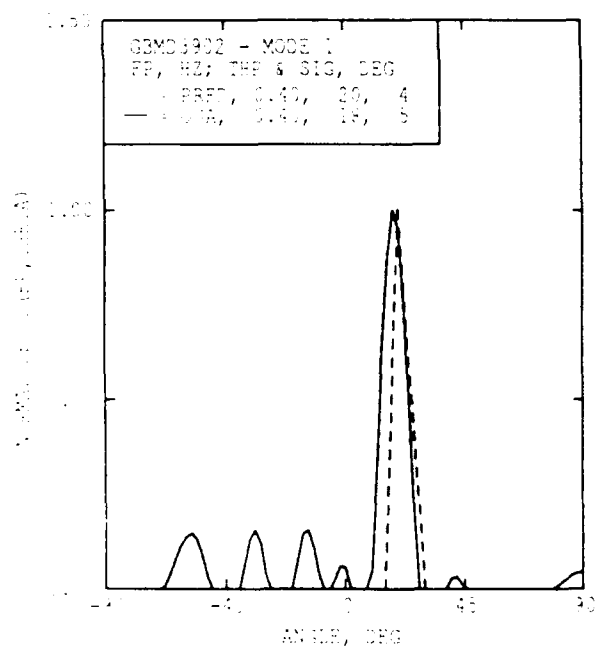
B) PRED. VS. OGA OFFAXIAL SPREADING + PRED FREQ  
DATE CODE = B



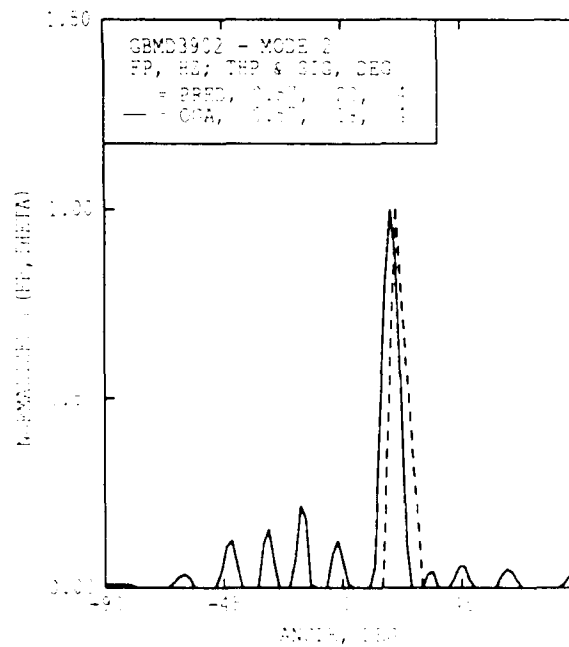
C) PRED. VS. OGA OFFAXIAL SPREADING + PRED FREQ  
DATE CODE = B



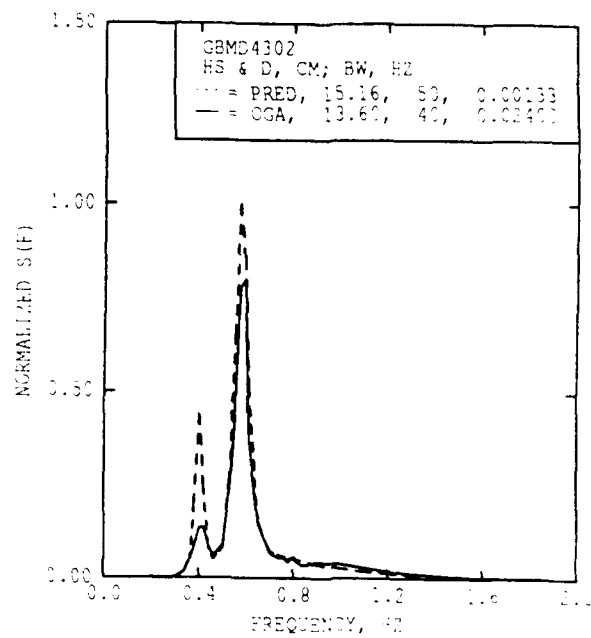
A) PRED. VS. OGA FREQUENCY SPECTRA  
PAGE CODE = B



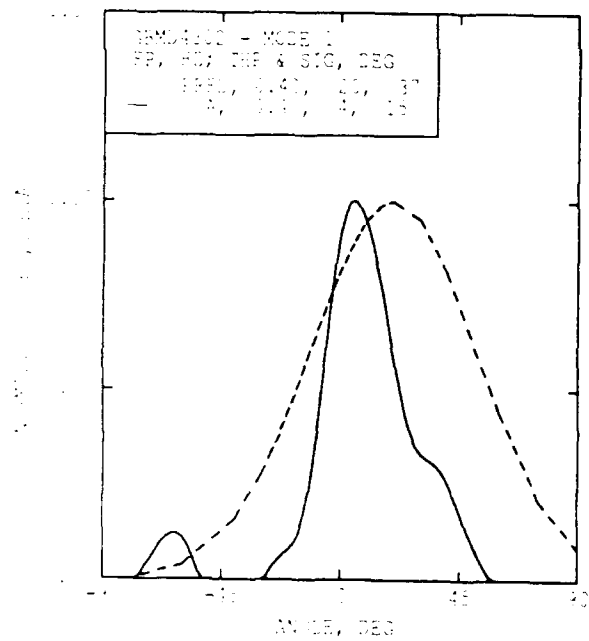
B) PRED. VS. OGA BEAM SPREADING (MODE 1)  
PAGE CODE = C



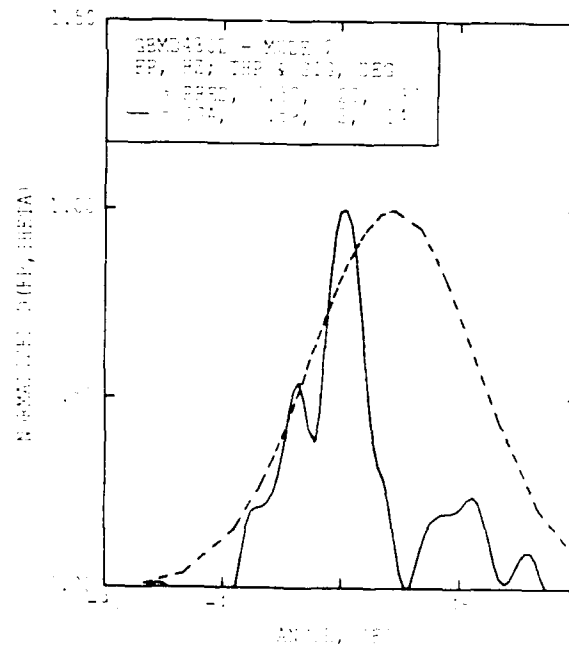
C) PRED. VS. OGA BEAM SPREADING (MODE 2)  
PAGE CODE = D



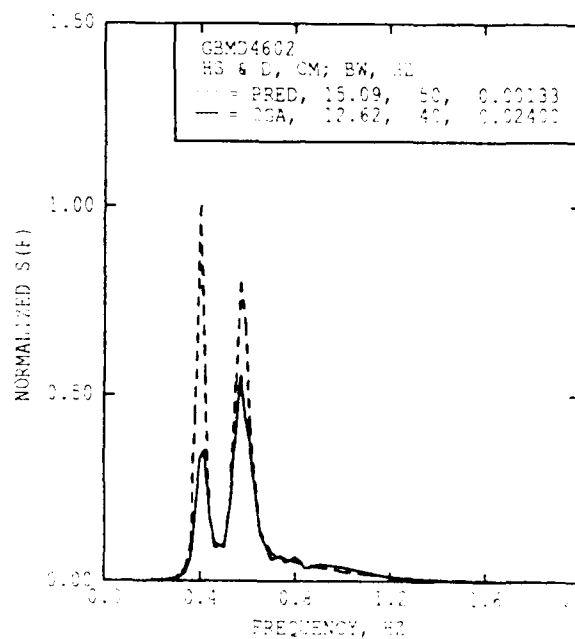
A) PRED. VS. OGA FREQUENCY SPECTRA  
PAGE CODE = A



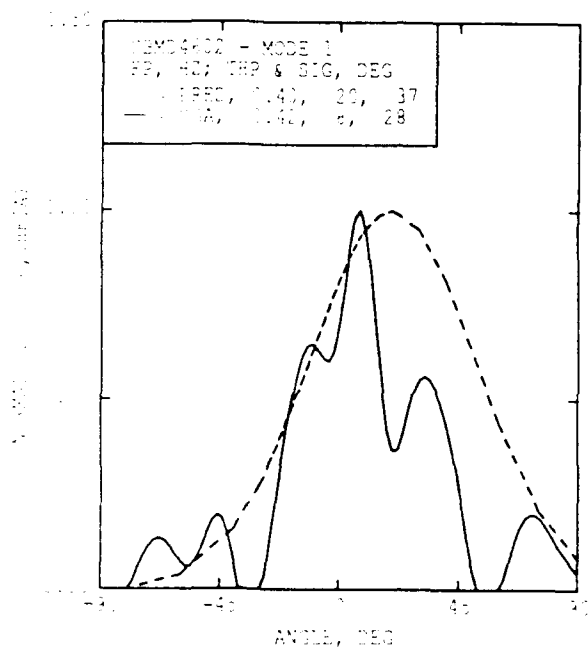
A) PRED. VS. OGA SPREADING 1 DAY PRED



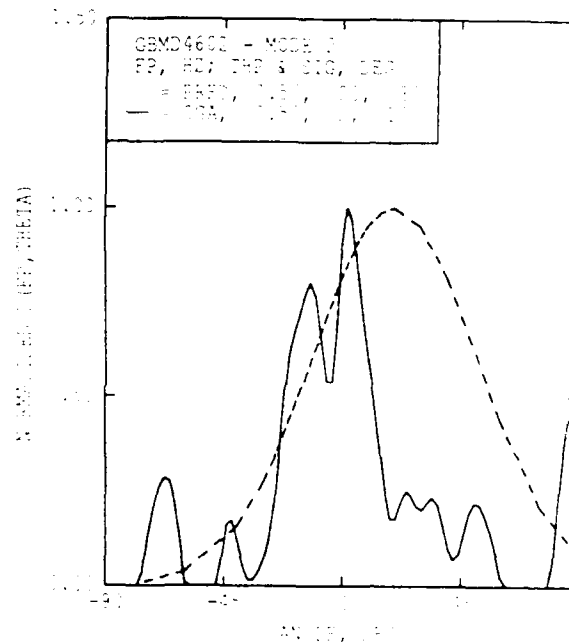
A) PRED. VS. OGA SPREADING 1 DAY PRED



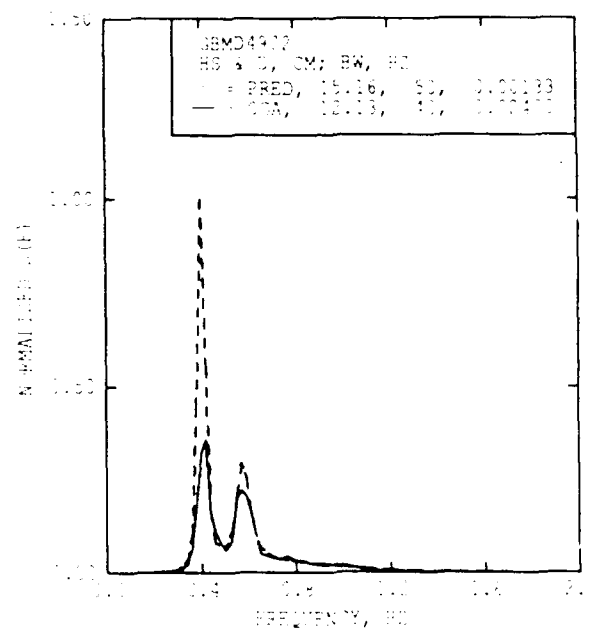
AP PRED. VS. OGA FREQUENCY SPECTRA  
PAGE CODE = A



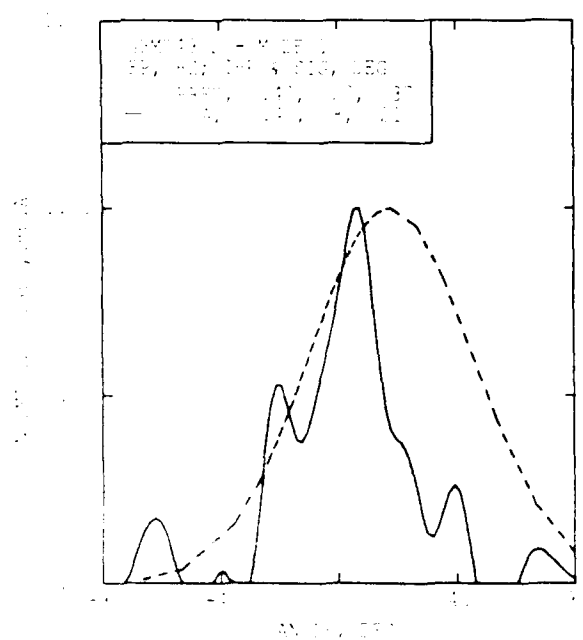
AP PRED. VS. OGA SPREADING BEAM - 001  
PAGE CODE = A



AP PRED. VS. OGA SPREADING BEAM - 002  
PAGE CODE = A

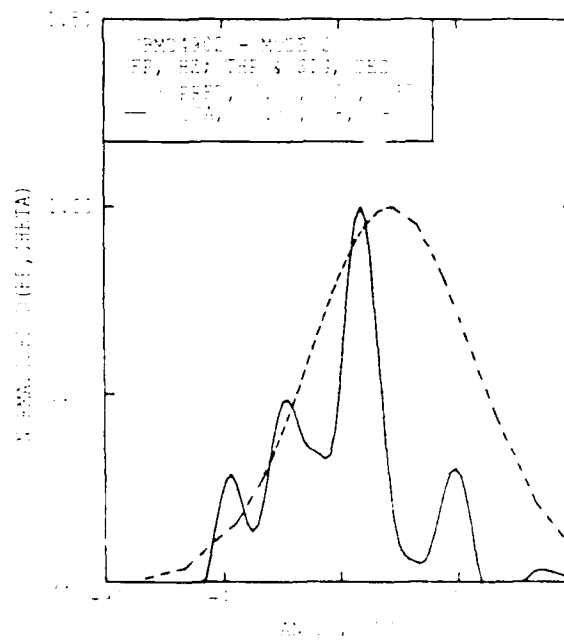


AP PRED. TO JCA FREQUENCY 0.00000  
 AP PRED. - A



ANGLE, DEG

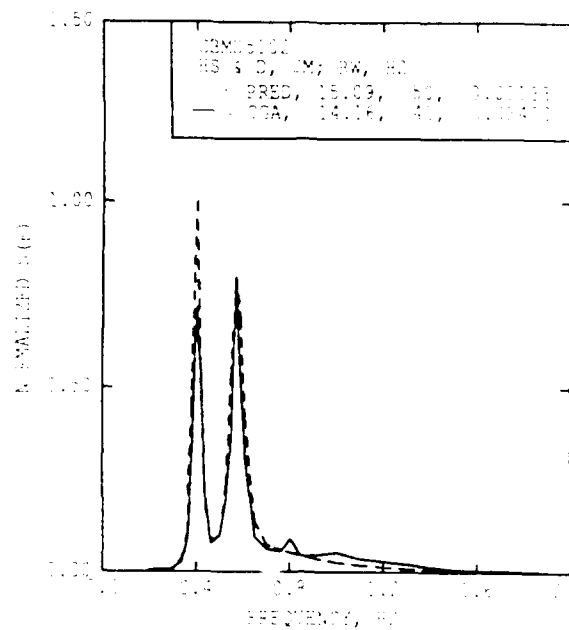
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 AP PRED. - A



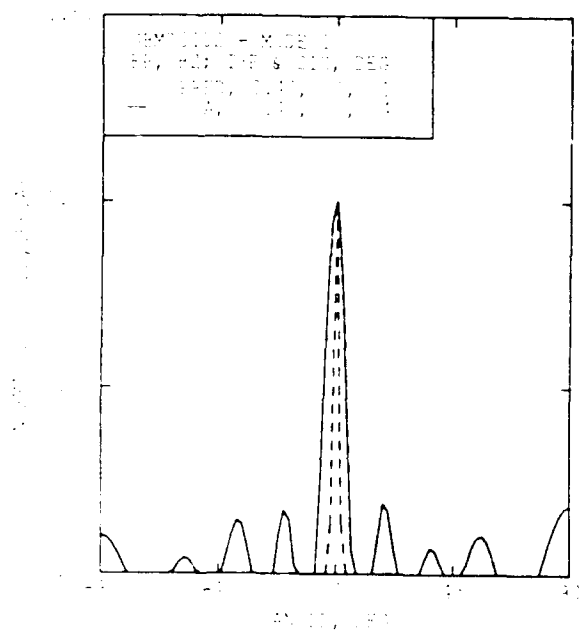
ANGLE, DEG

AP PRED. TO JCA FREQUENCY 0.00000  
 AP PRED. - A

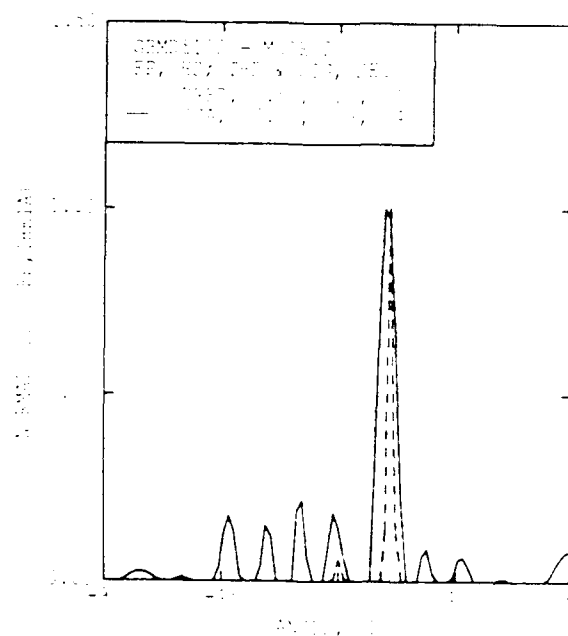




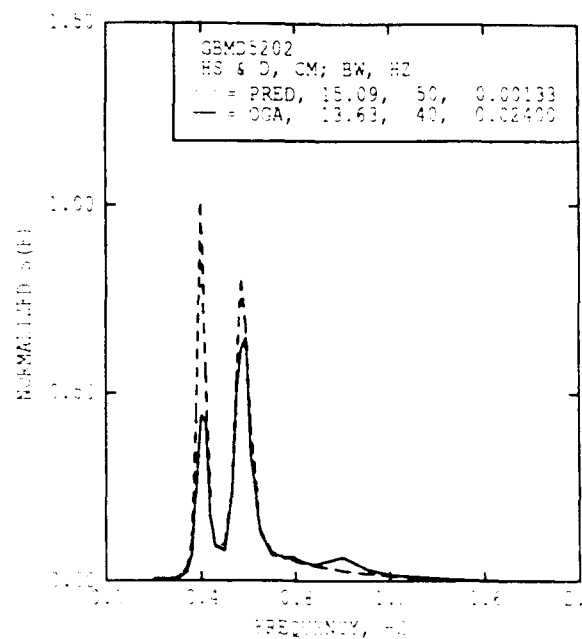
A. PRED. OF OGA EFFICIENCY OF TNA  
MAGNITUDE B



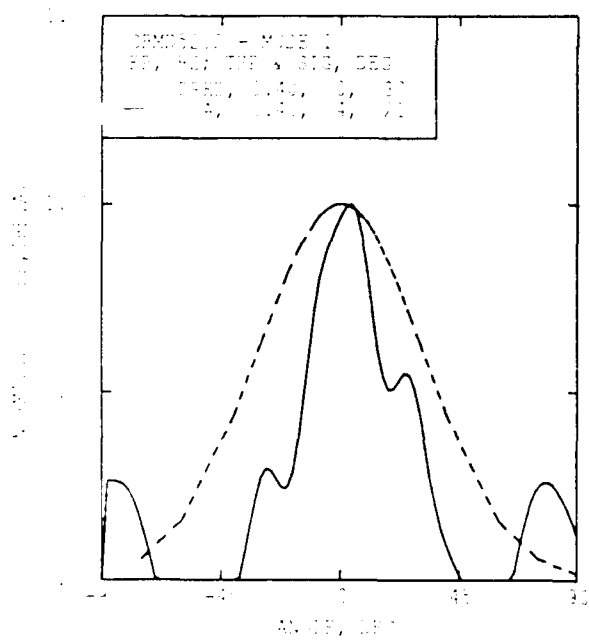
A. PRED. OF OGA EFFICIENCY OF TNA  
MAGNITUDE B



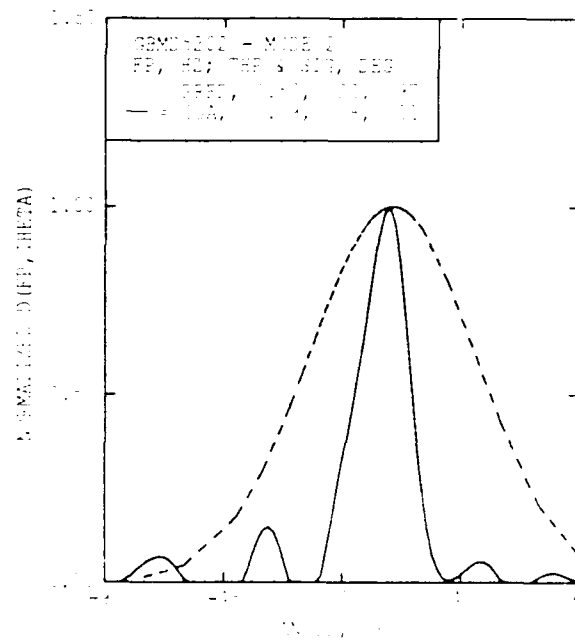
A. PRED. OF OGA EFFICIENCY OF TNA  
MAGNITUDE B



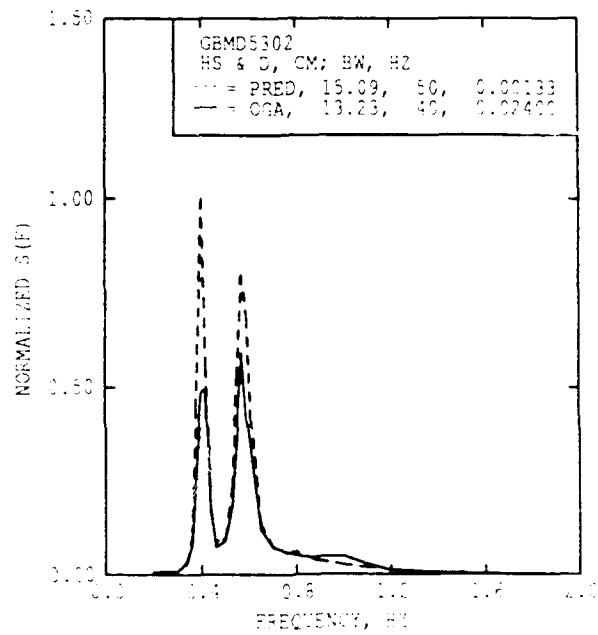
AT THEL. NO. 10A FREQUENCY 10.000A  
DATE 0000-0-0



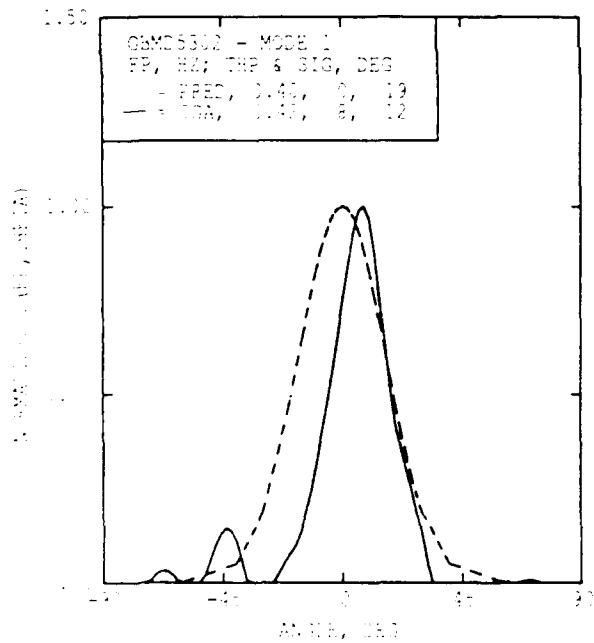
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DATE 0000-0-0



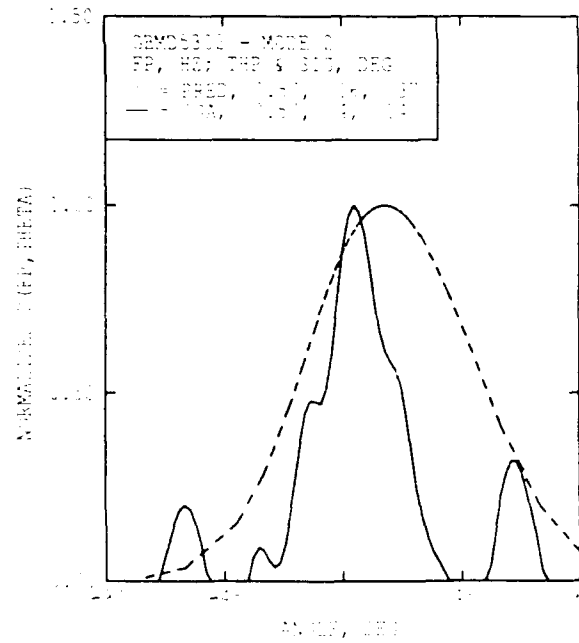
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DATE 0000-0-0



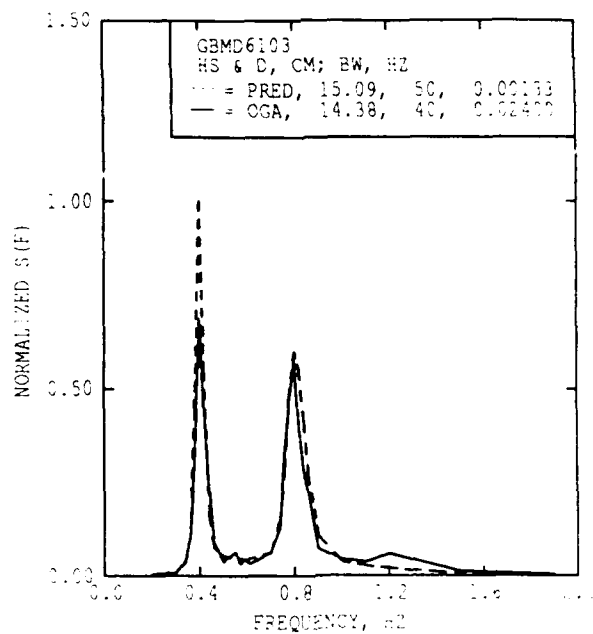
A) PRED. VS. OGA FREQUENCY SPECTRA  
WAVE CODE = A



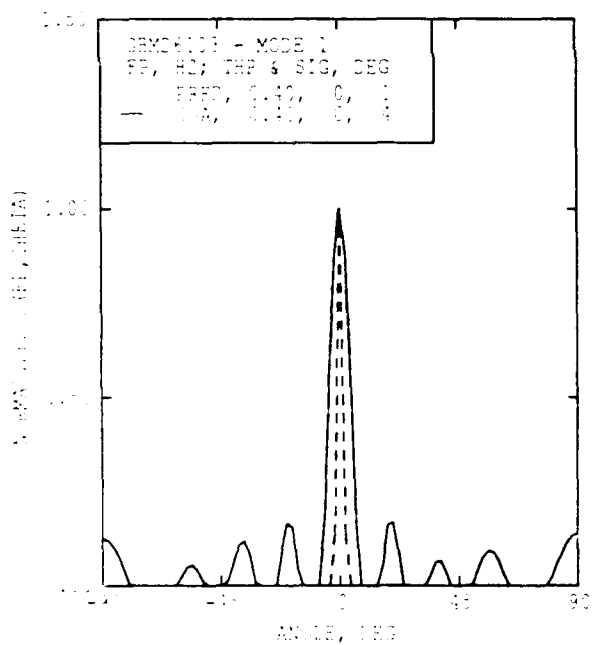
B) PRED. VS. OGA PREDICTION - BEAK PRED



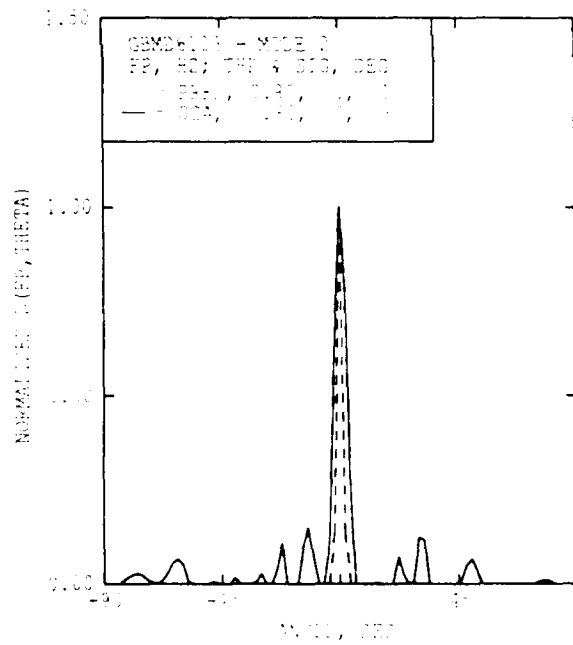
C) PRED. VS. OGA PREDICTION - BEAK PRED



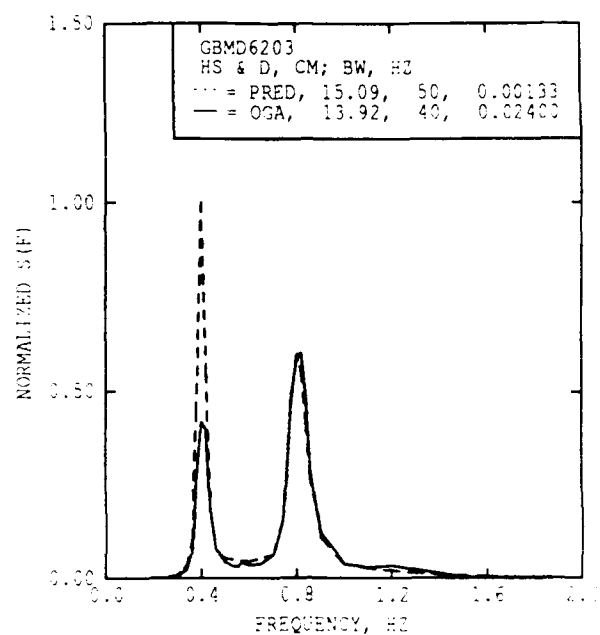
A) PRED. VS. OGA FREQUENCY SPECTRA  
GAGE CODE = R



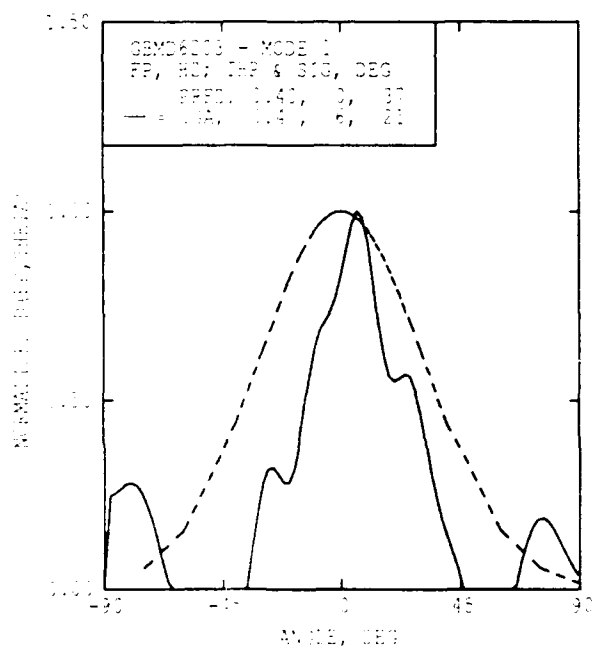
B) PRED. VS. OGA DIRECTIONAL FREQ SPECTRA  
GAGE CODE = R



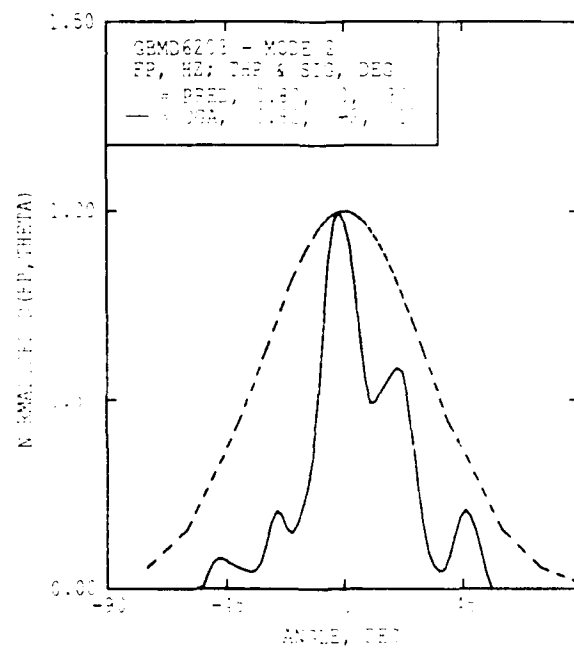
C) PRED. VS. OGA DIRECTIONAL FREQ SPECTRA  
GAGE CODE = R



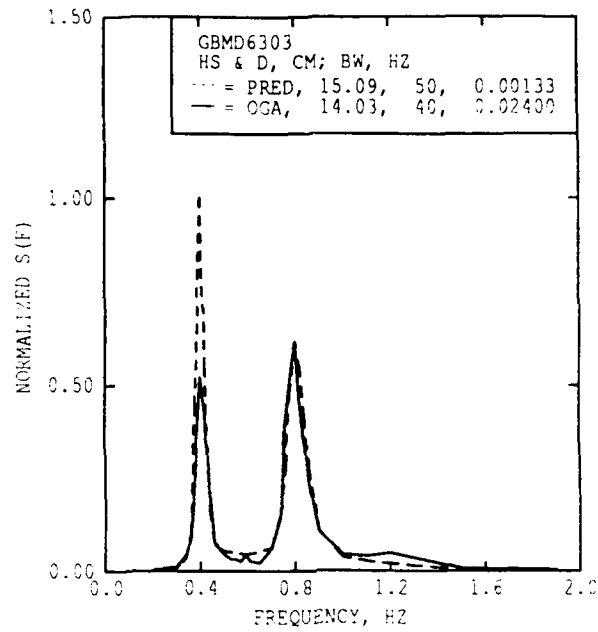
A) PRED. VS. OGA FREQUENCY SPECTRA  
GAGE CODE = 0



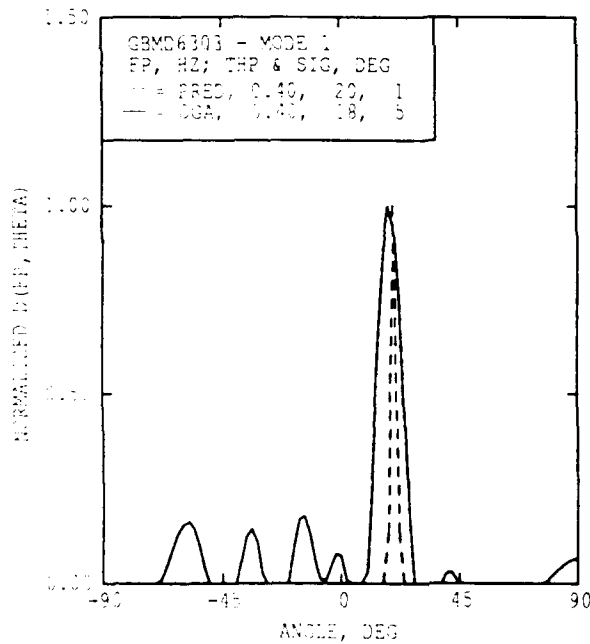
B) PRED. VS. OGA DIRECTIONAL SPECTRA  
GAGE CODE = 0



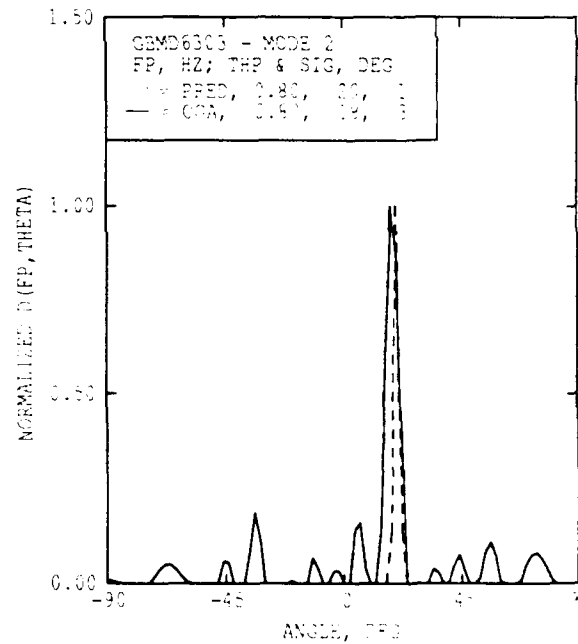
C) PRED. VS. OGA DIRECTIONAL SPECTRA  
GAGE CODE = 0



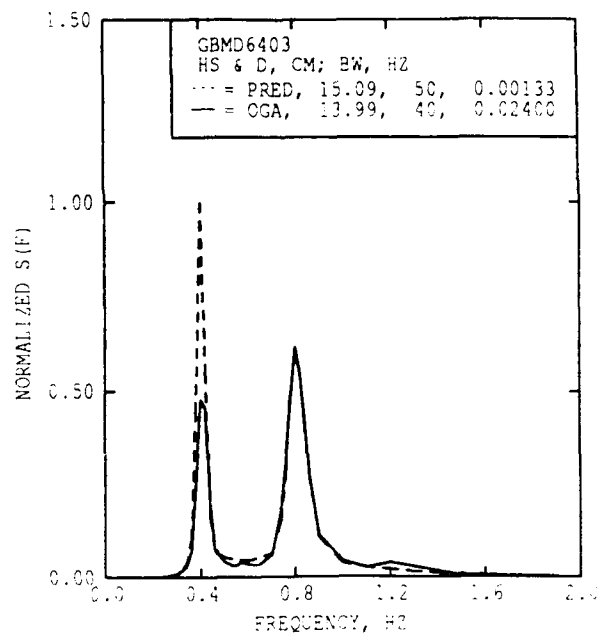
A) PRED. VS. OGA FREQUENCY SPECTRA  
GAGE CODE = B



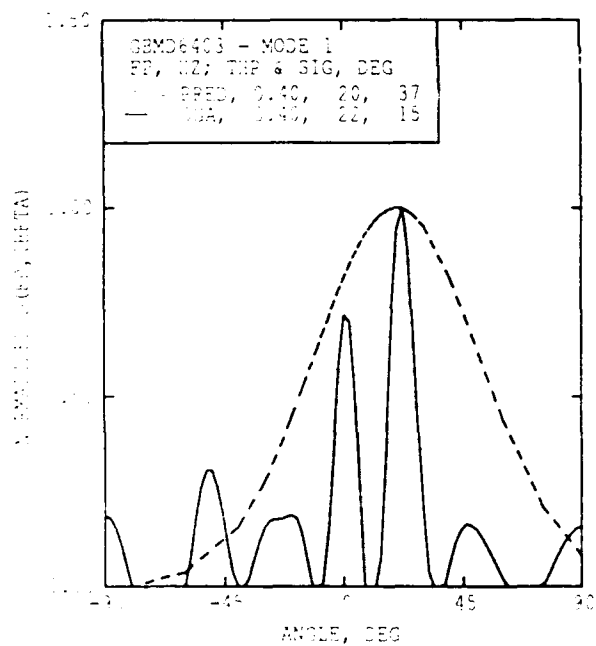
B) PRED. VS. OGA SPREADING 1 PEAK PRED  
GAGE CODE = B



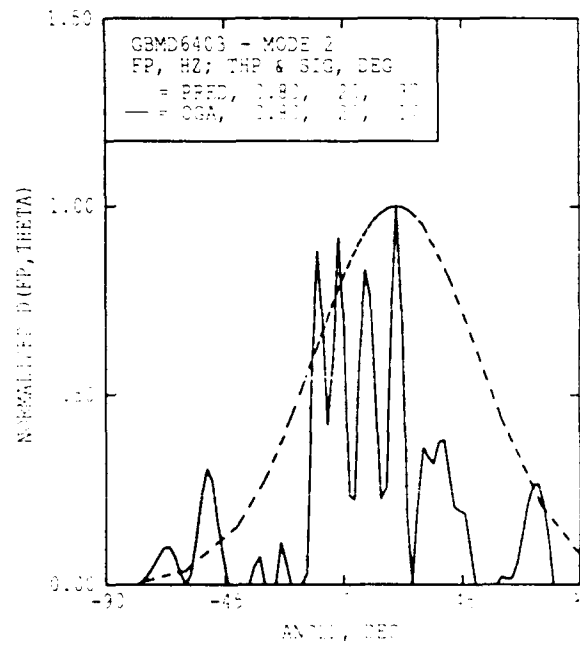
C) PRED. VS. OGA SPREADING 2 PEAK PRED  
GAGE CODE = B



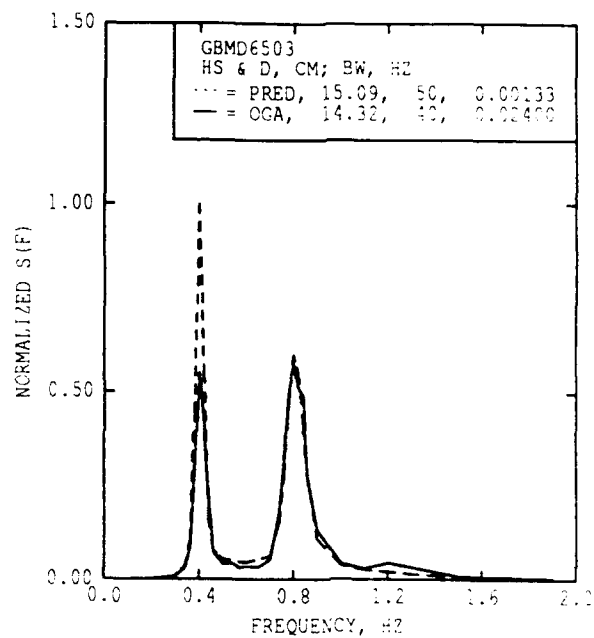
A) PRED. VS. OGA FREQUENCY SPECTRA  
CASE CODE = B



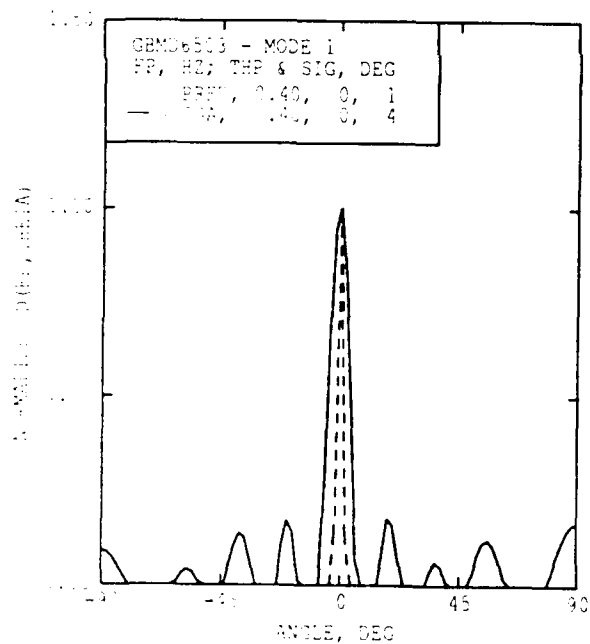
B) PRED. VS. OGA SPREADING & PEAK FREQ  
CASE CODE = B



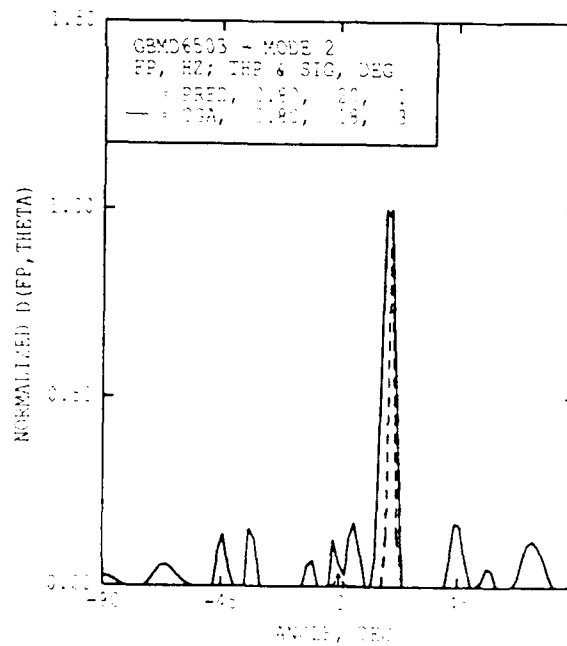
C) PRED. VS. OGA SPREADING & PEAK FREQ  
CASE CODE = B



A) PRED. VS. OGA FREQUENCY SPECTRA  
GAGE CODE = B

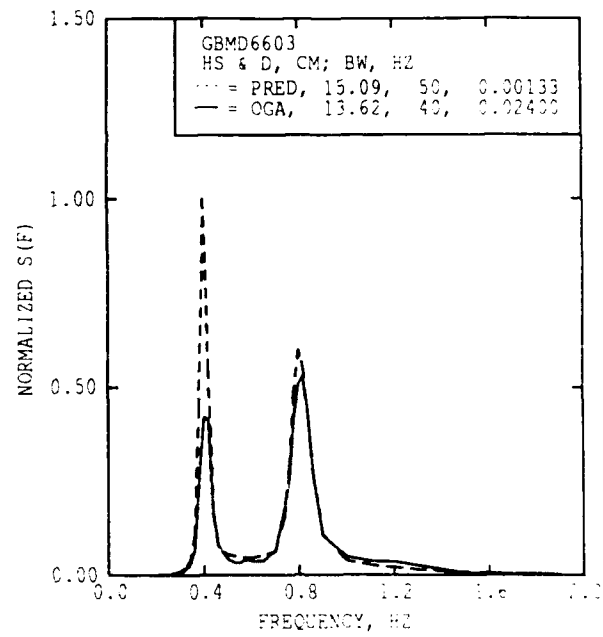


B) PRED. VS. OGA BEAM SPREADING & PEAK FREQ  
GAGE CODE = B

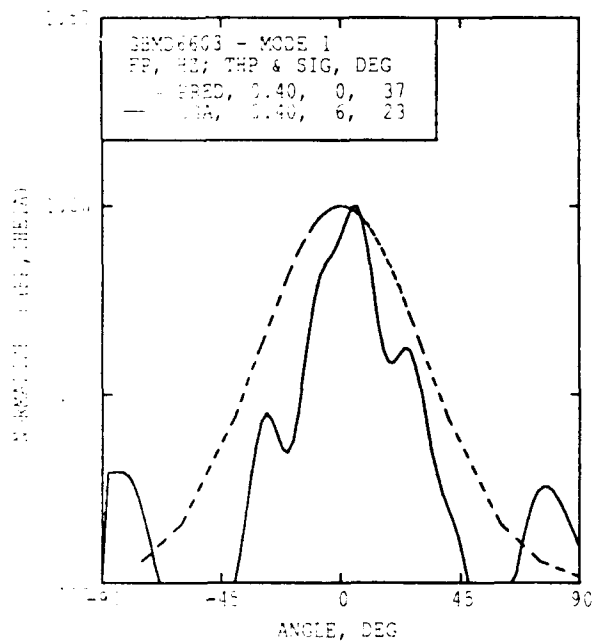


C) PRED. VS. OGA BEAM SPREADING & PEAK FREQ  
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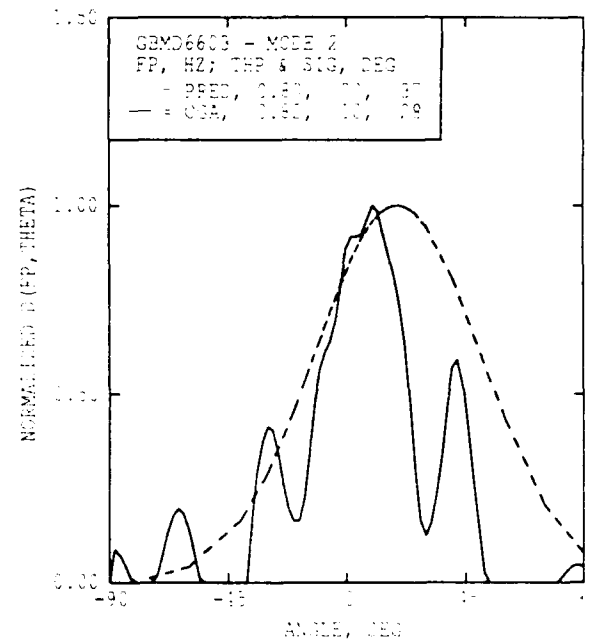




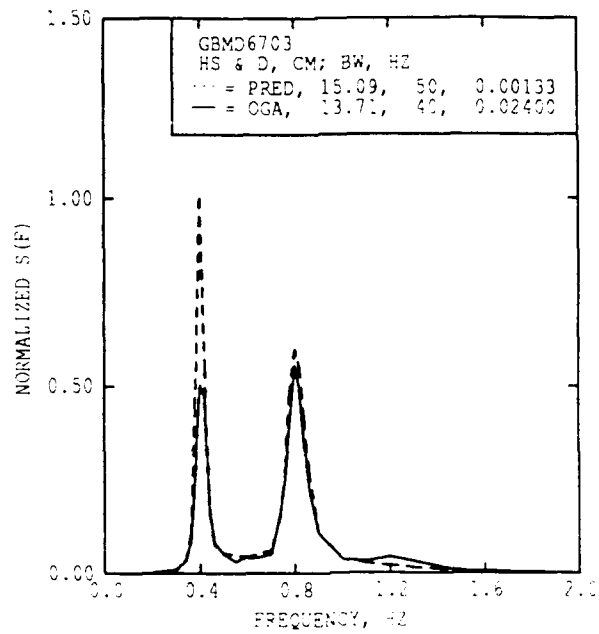
A) PRED. VS. OGA FREQUENCY SPECTRA  
GAGE CODE = C



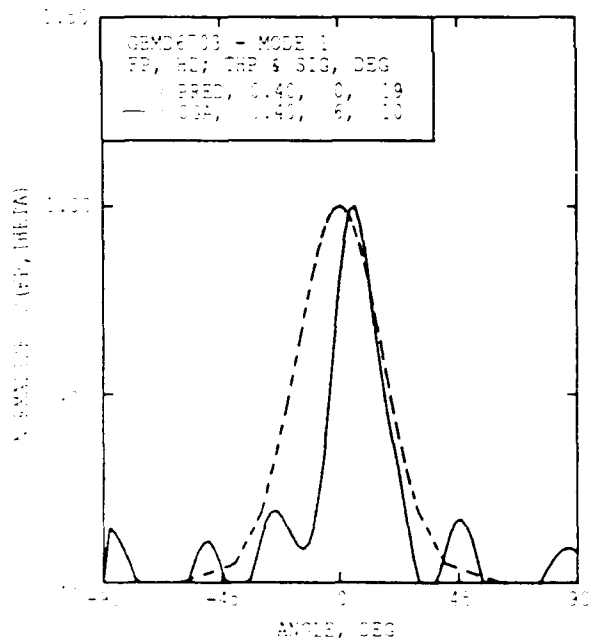
B) PRED. VS. OGA SPREADING PEAK PRED  
GAGE CODE = C



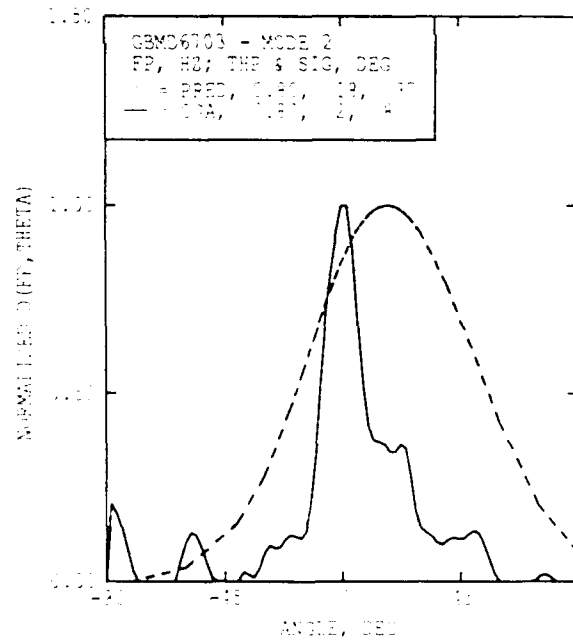
C) PRED. VS. OGA SPREADING PEAK PRED  
GAGE CODE = C



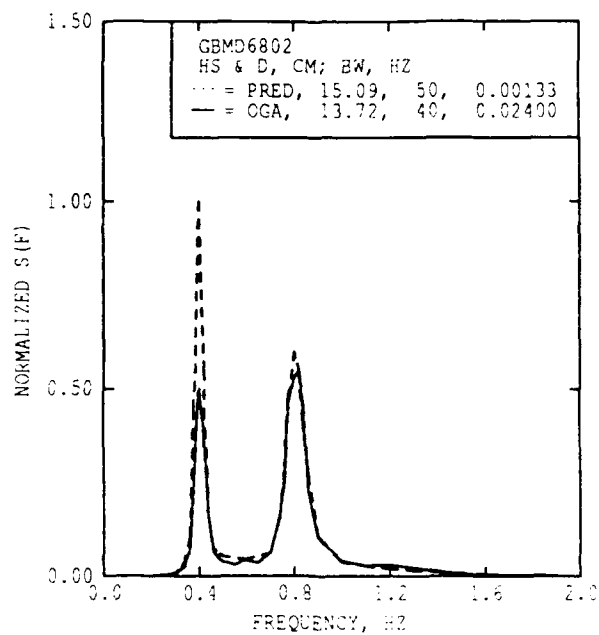
A) PRED. VS. OGA FREQUENCY SPECTRA  
 GAGE CODE = A



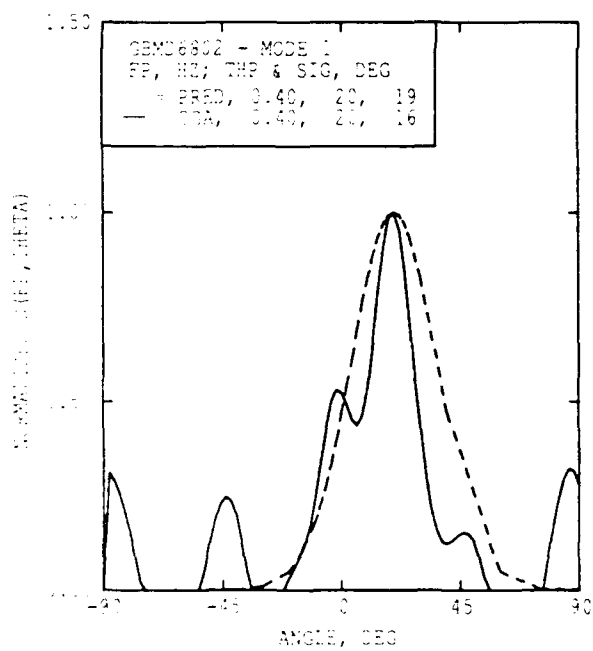
A) PRED. VS. OGA ANGULAR DISTRIBUTION  
 GAGE CODE = A



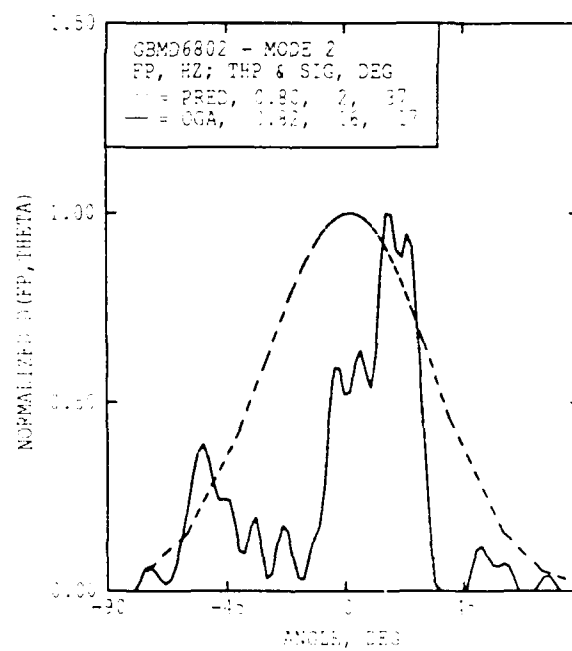
B) PRED. VS. OGA ANGULAR DISTRIBUTION  
 GAGE CODE = A



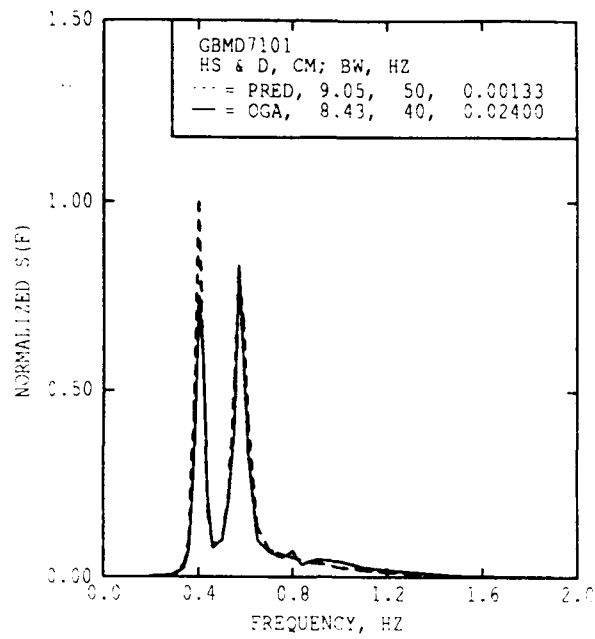
A) PRED. VS. OGA FREQUENCY SPECTRA  
 GAGE CODE = A



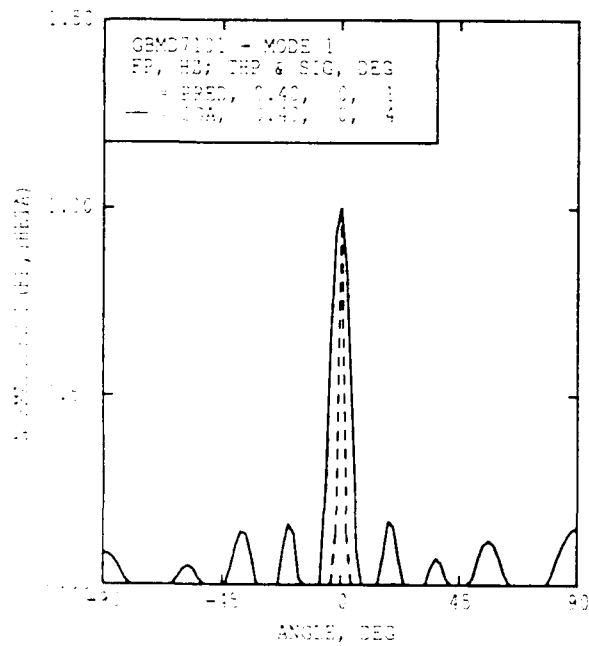
B) PRED. VS. OGA DIRECTIVITY & PEAK FREQ  
 GAGE CODE = A



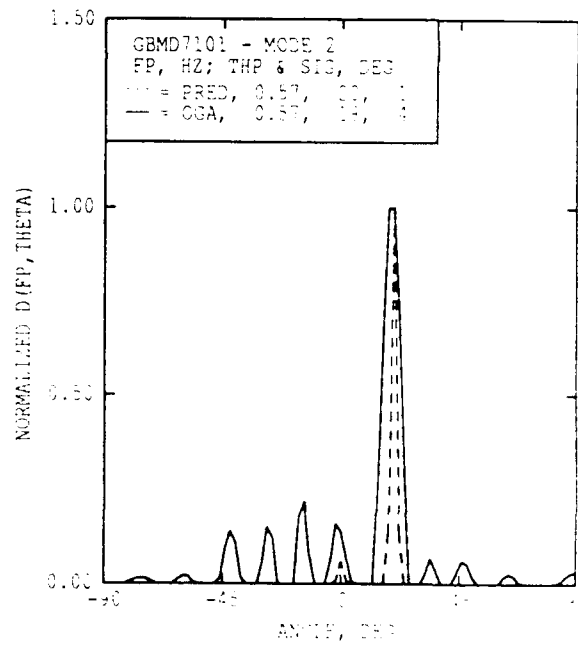
C) PRED. VS. OGA DIRECTIVITY & PEAK FREQ  
 GAGE CODE = A



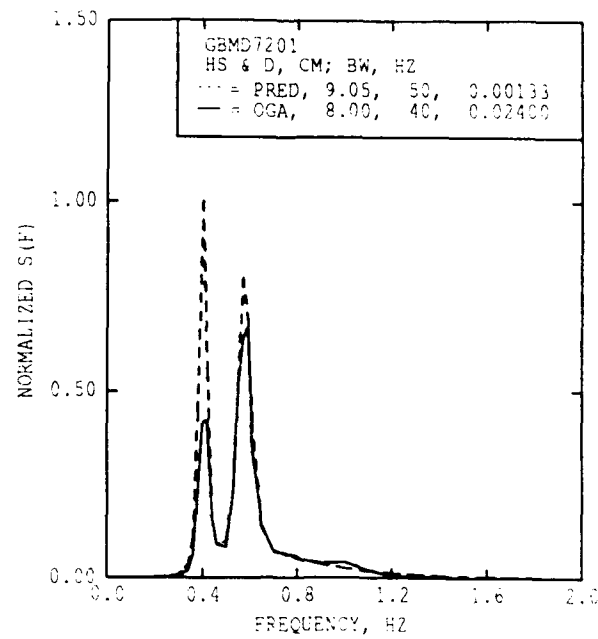
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GAGE CODE = B



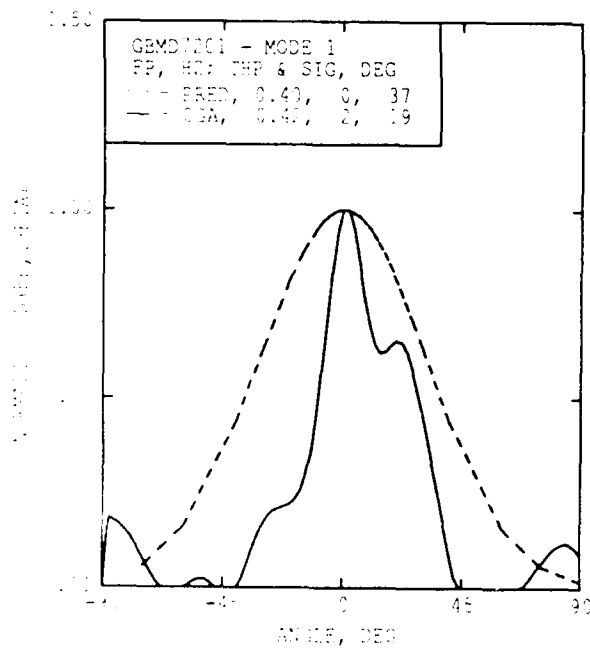
B) PRED. VS. OGA DIRECTIONAL SPECTRA  
GAGE CODE = B



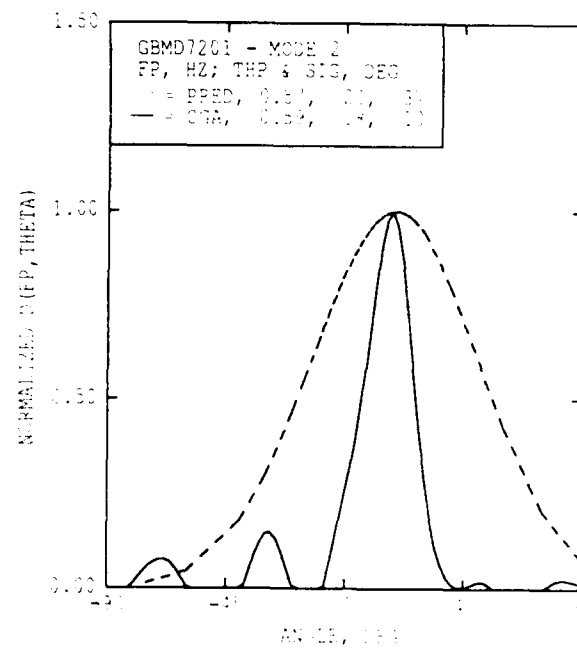
C) PRED. VS. OGA DIRECTIONAL SPECTRA  
GAGE CODE = B



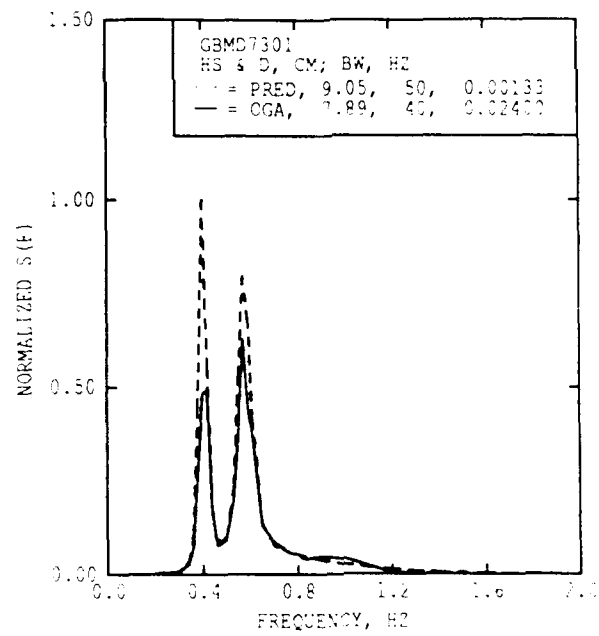
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GAGE CODE = C



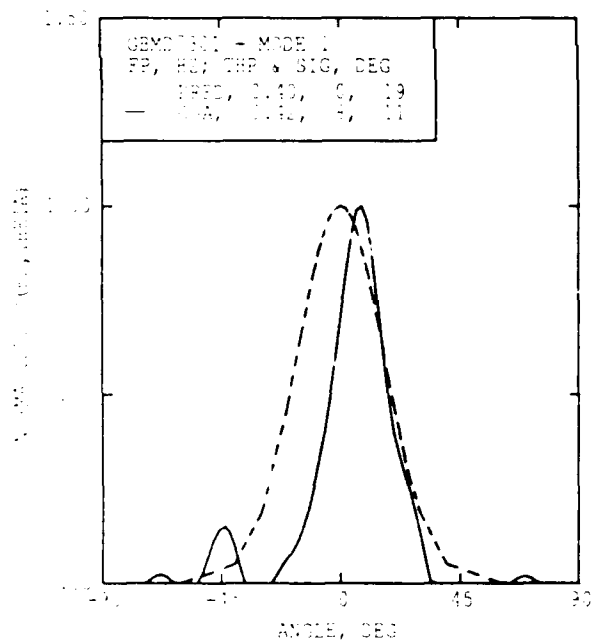
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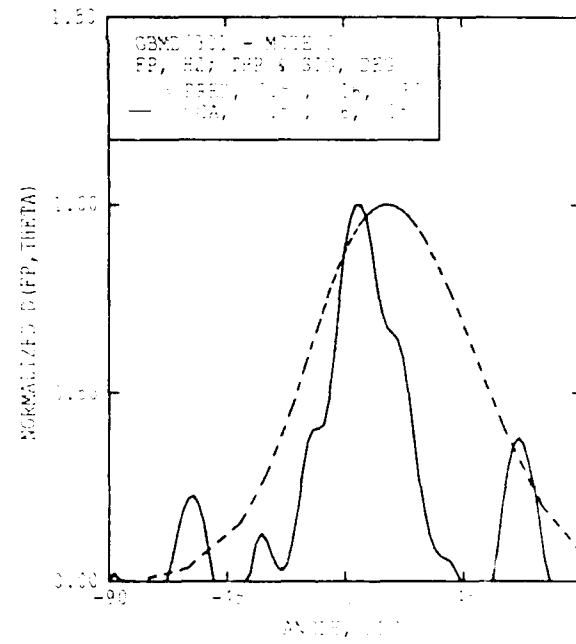
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GAGE CODE = C



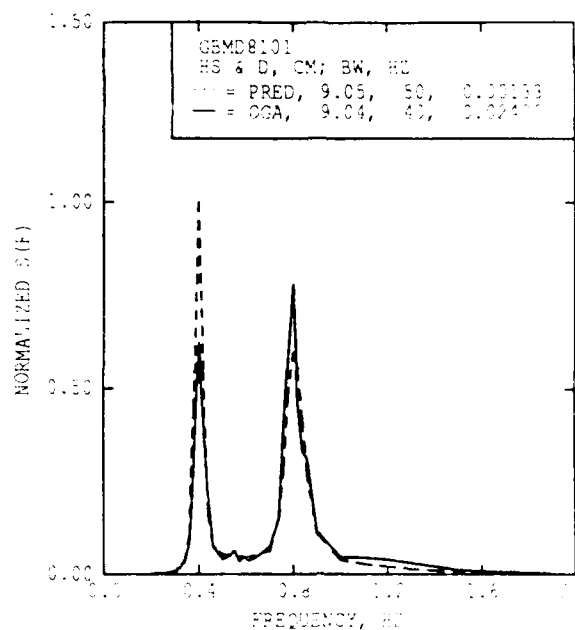
A) PRED. VS. LLA FREQUENCY SPECTRA  
PAGE CODE = A



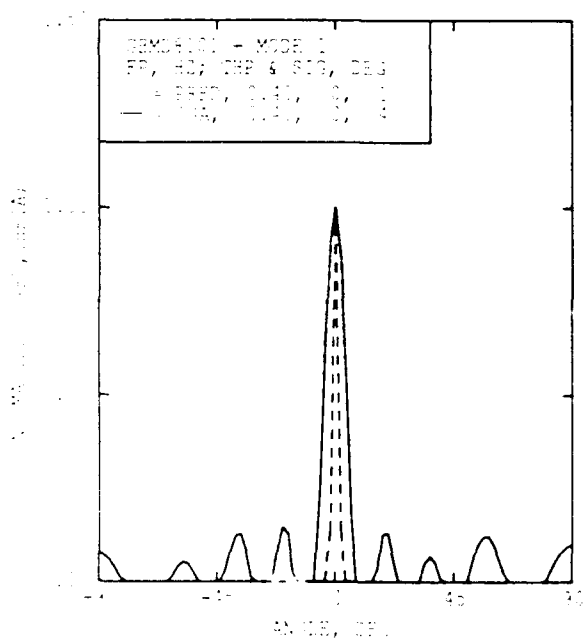
B) PRED. VS. LLA SPREADING & PEAK FREQ.  
PAGE CODE = A



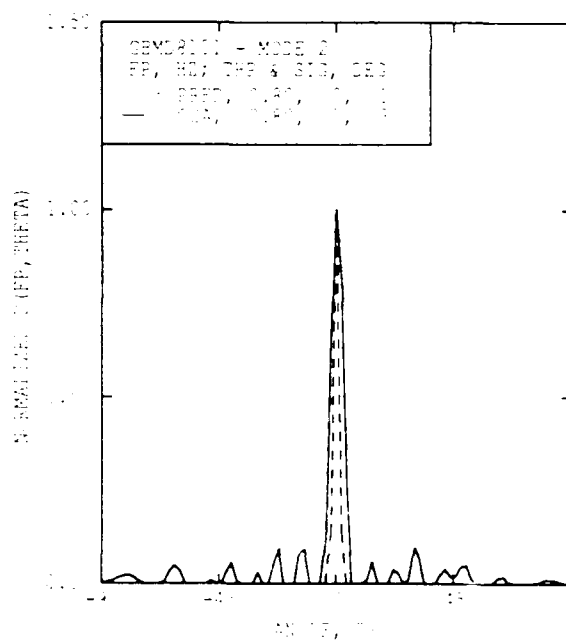
C) PRED. VS. LLA SPREADING & PEAK FREQ.  
PAGE CODE = A



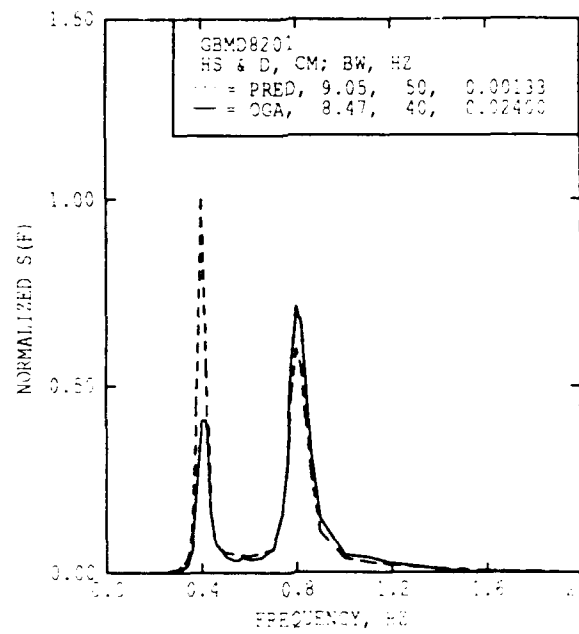
A. PRED. VS. OGA FREQUENCY CORRESP  
BASE CODE 8



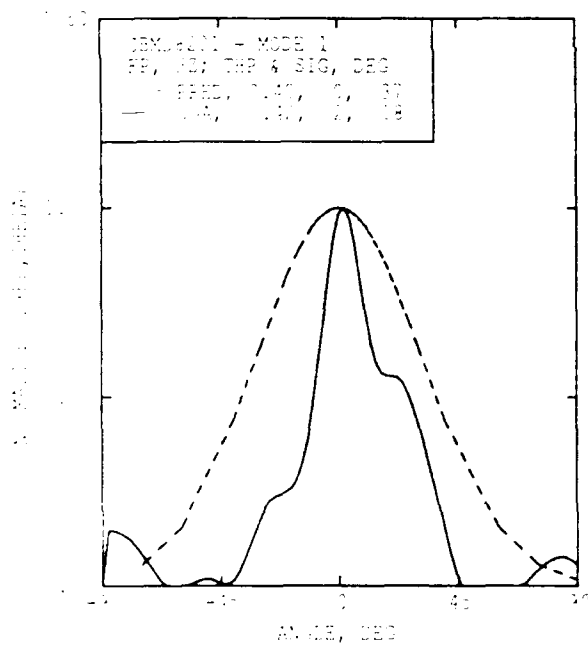
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BASE CODE 8



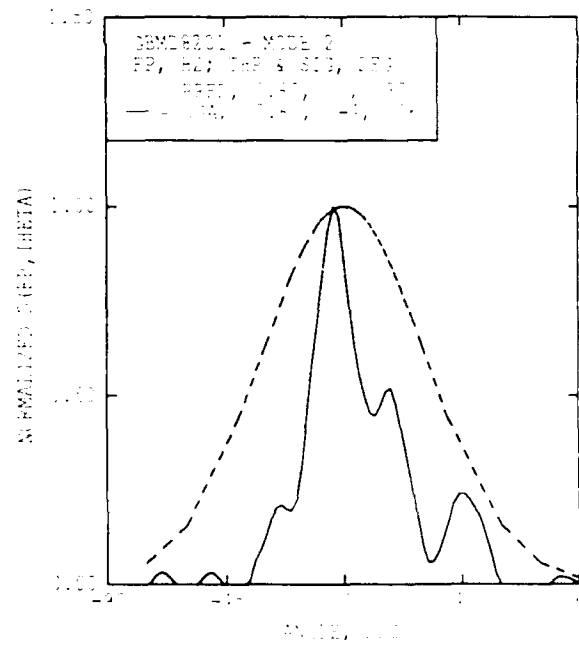
C. PRED. VS. OGA FREQUENCY CORRESP  
BASE CODE 8



AN PRED. VS. OGA FREQUENCY SPECTRA  
DATE CODE = C

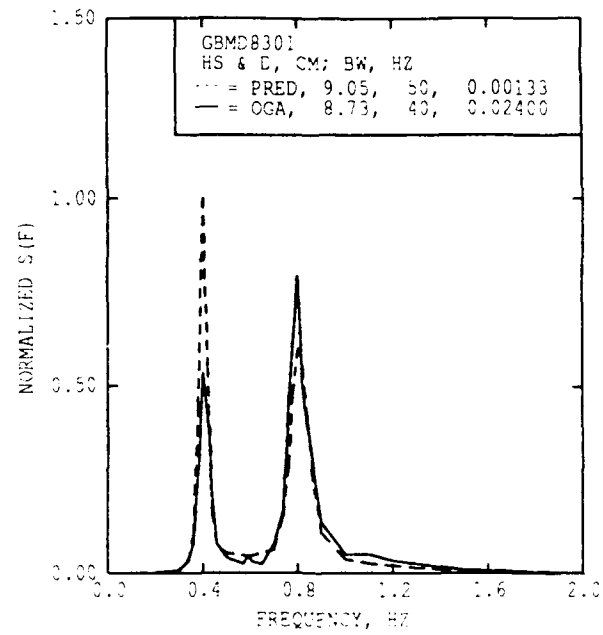


AN PRED. VS. OGA ANGLE SPREAD - MODE 1

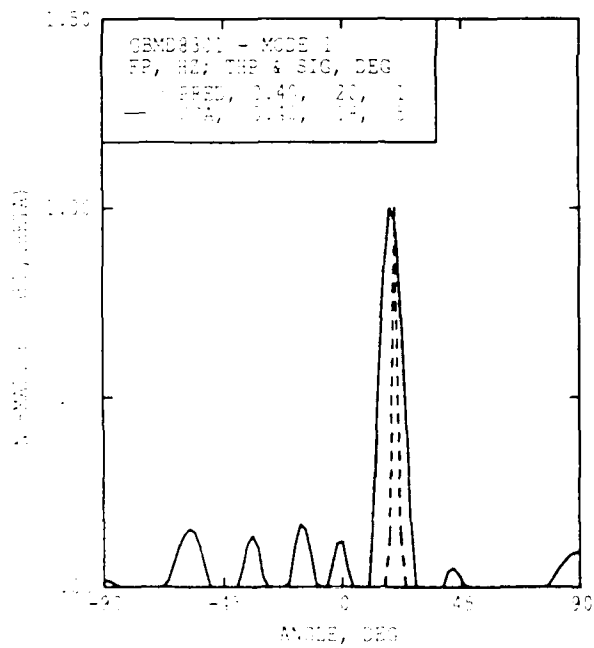


AN PRED. VS. OGA ANGLE SPREAD - MODE 2

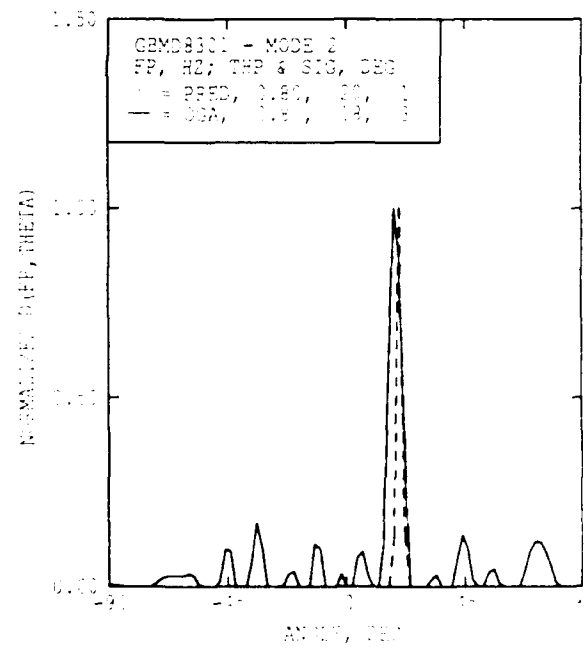




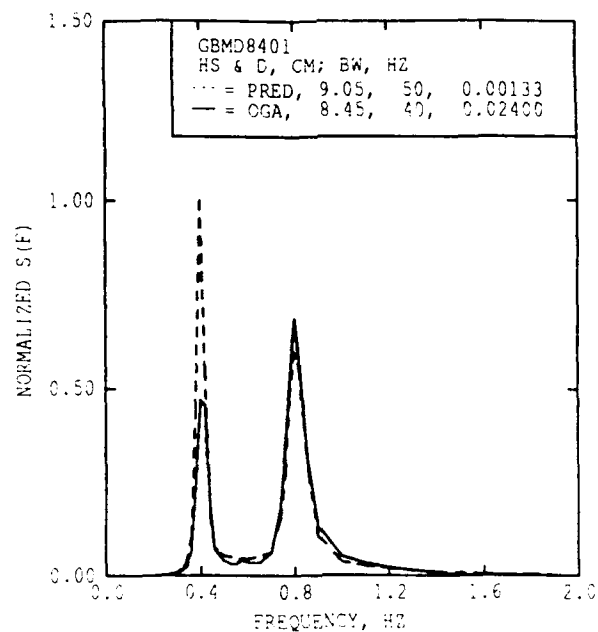
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GAGE CODE = B



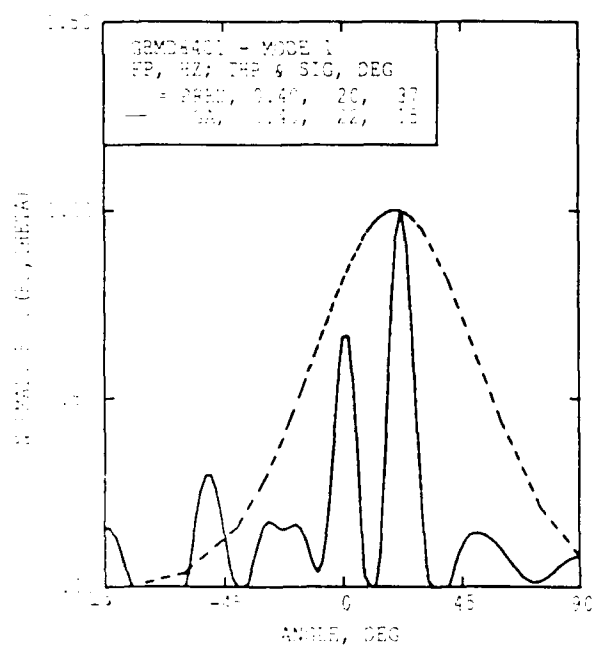
B) PRED. VS. OGA ANGLE SPECTRA  
GAGE CODE = B



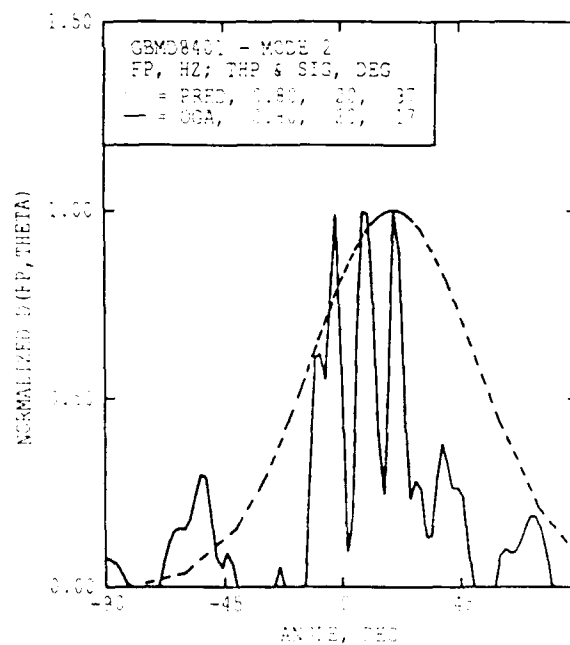
C) PRED. VS. OGA ANGLE SPECTRA  
GAGE CODE = B



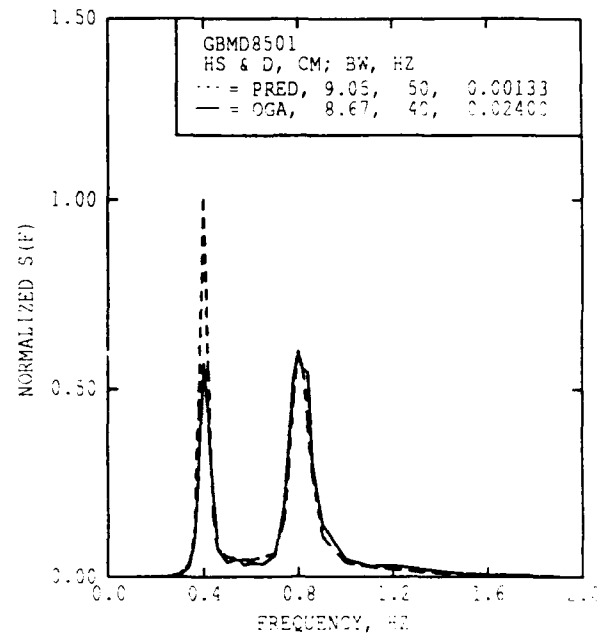
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PAGE CODE = B



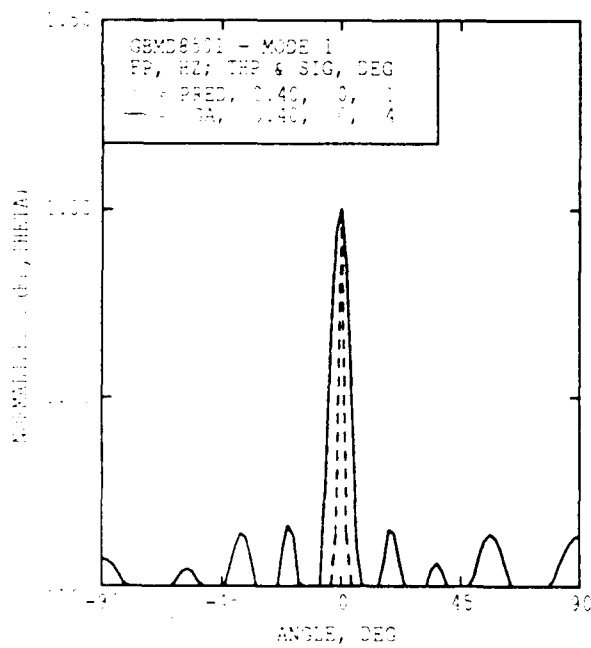
B) PRED. VS. OGA DIRECTIVITY PLOT  
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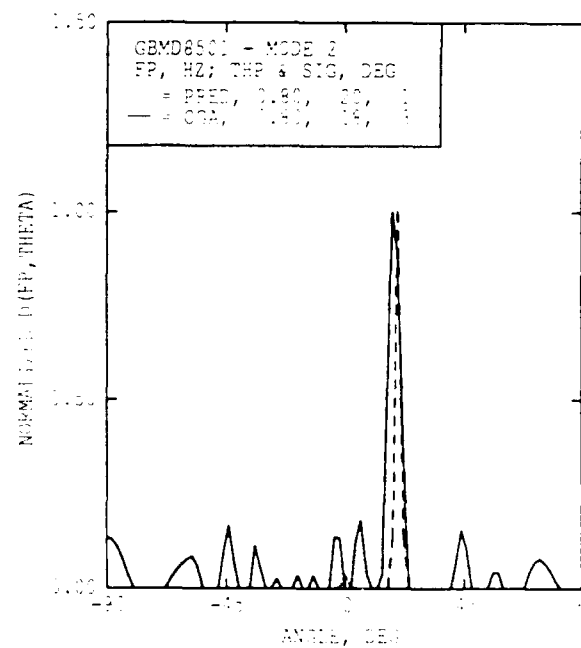
C) PRED. VS. OGA DIRECTIVITY PLOT  
PAGE CODE = B



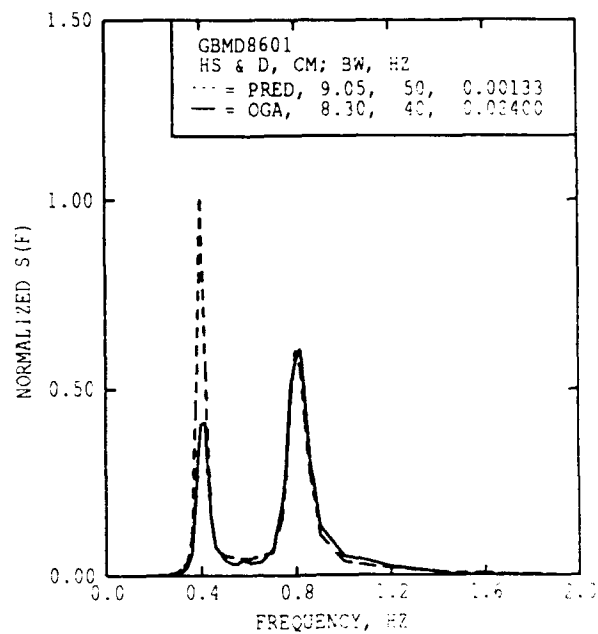
A) PRED. VS. OGA FREQUENCY SPECTRA  
 GAGE CODE = B



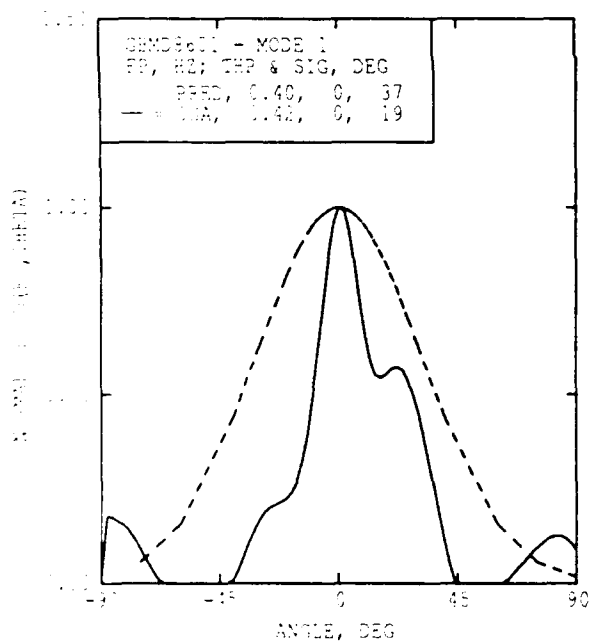
B) PRED. VS. OGA DIRECTIONAL PEAK PRED.



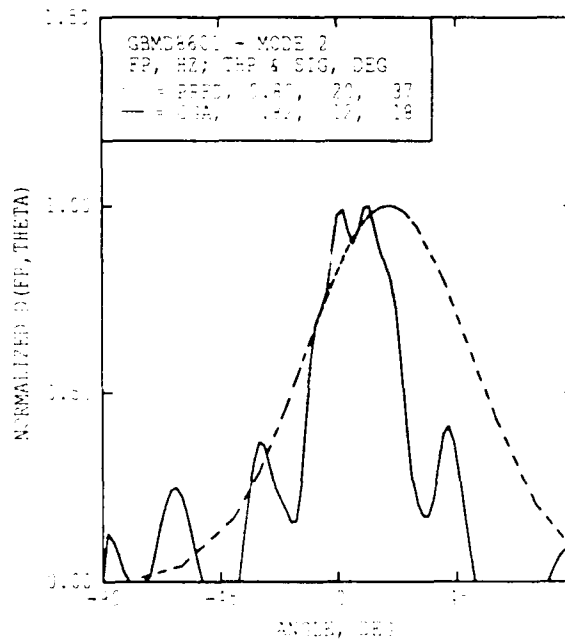
C) PRED. VS. OGA DIRECTIONAL PEAK PRED.



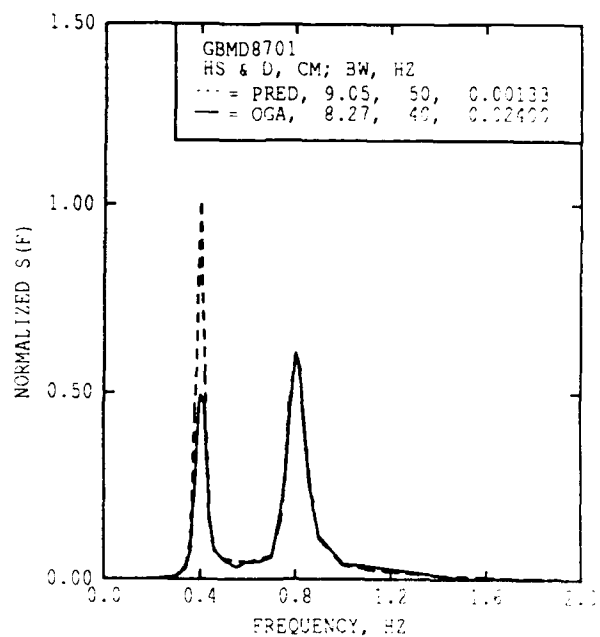
A) PRED. VS. OGA FREQUENCY SPECTRA  
GAGE CODE = C



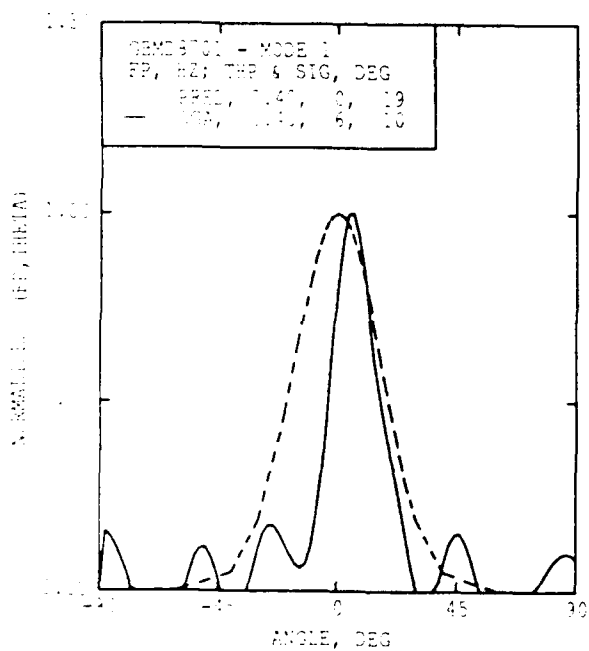
B) PRED. VS. OGA SPREADING & PEAK FREQ  
GAGE CODE = C



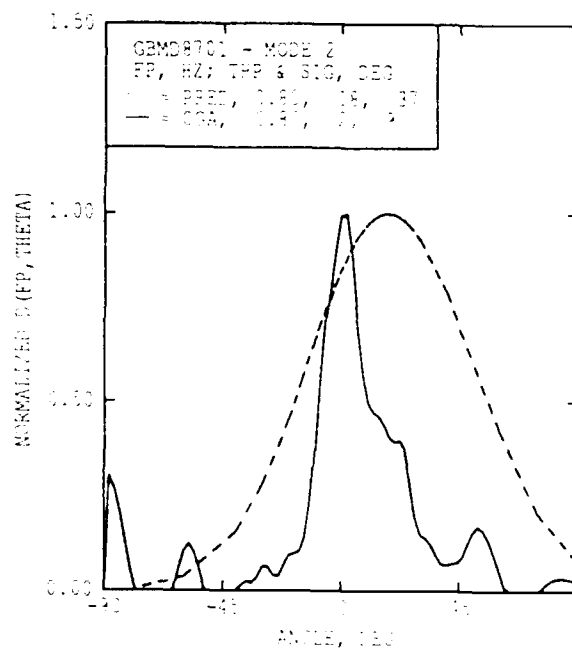
C) PRED. VS. OGA SPREADING & PEAK FREQ  
GAGE CODE = C



A) PRED. VS. OGA FREQUENCY SPECTRA  
 GAGE CODE = A

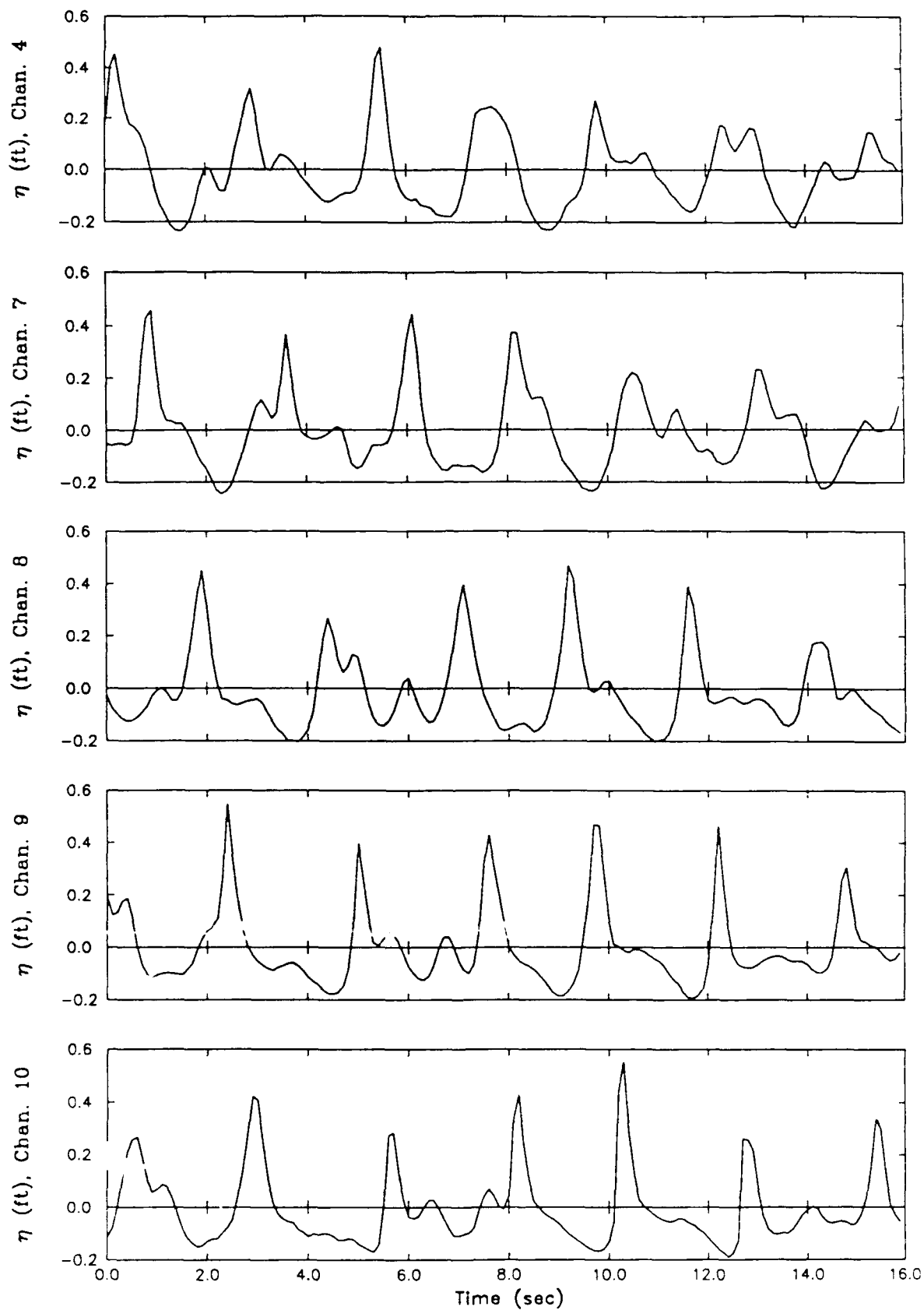


B) PRED. VS. OGA SPREADING @ PEAK FREQ  
 GAGE CODE = A

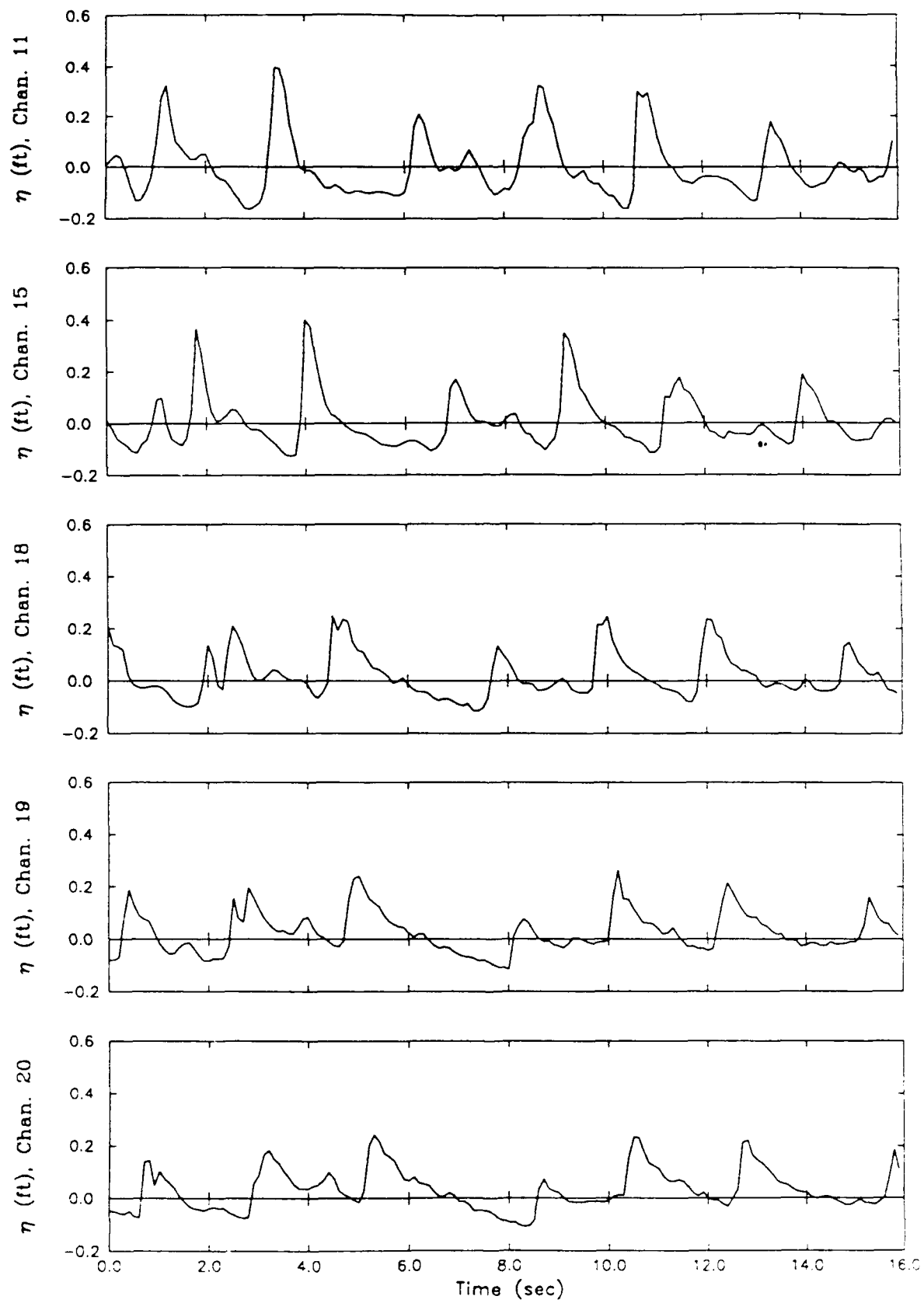


C) PRED. VS. OGA SPREADING @ PEAK FREQ  
 GAGE CODE = A

APPENDIX D: WAVE ELEVATION TIME SERIES

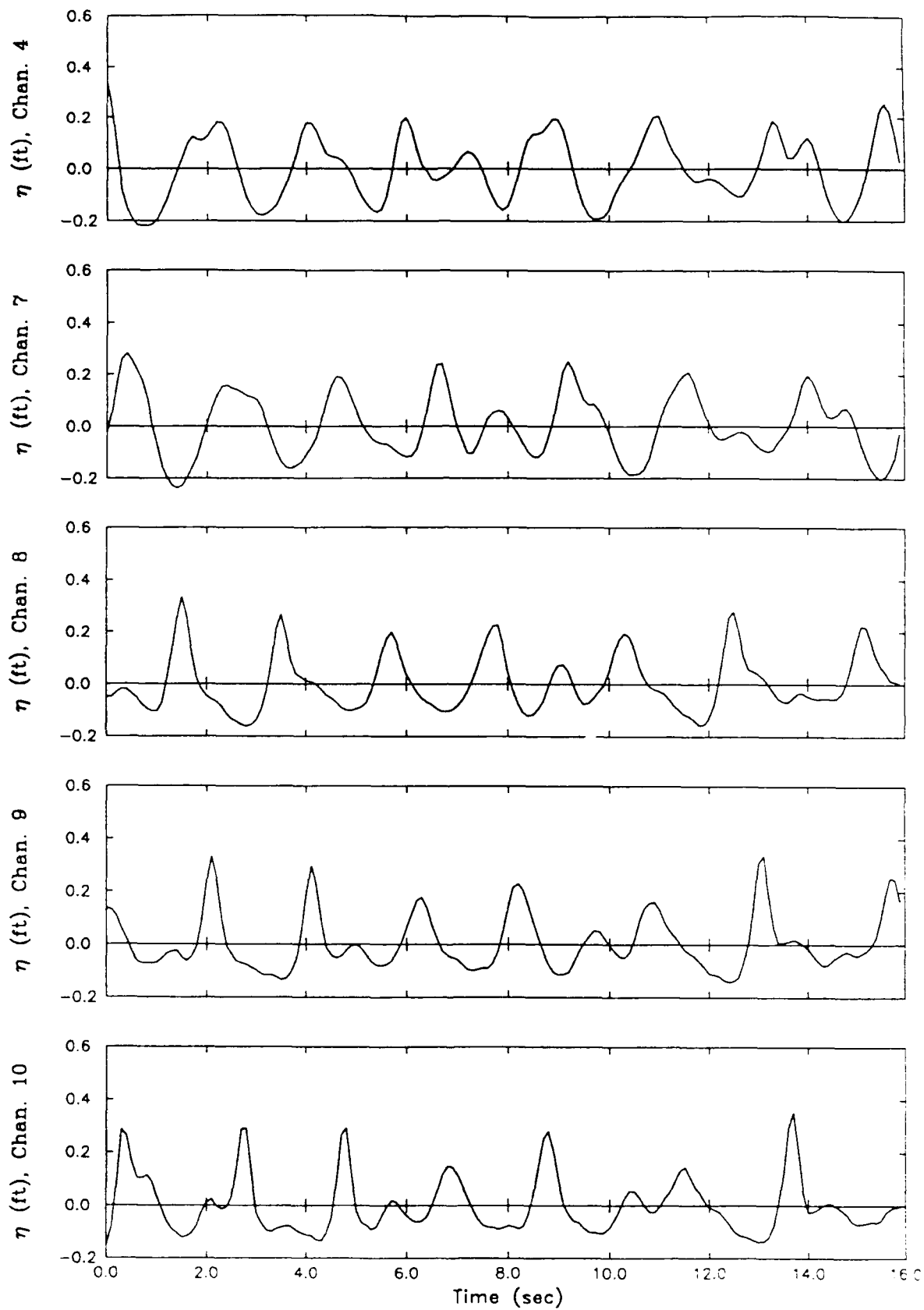


Generalized Beach Model, GBMS0105

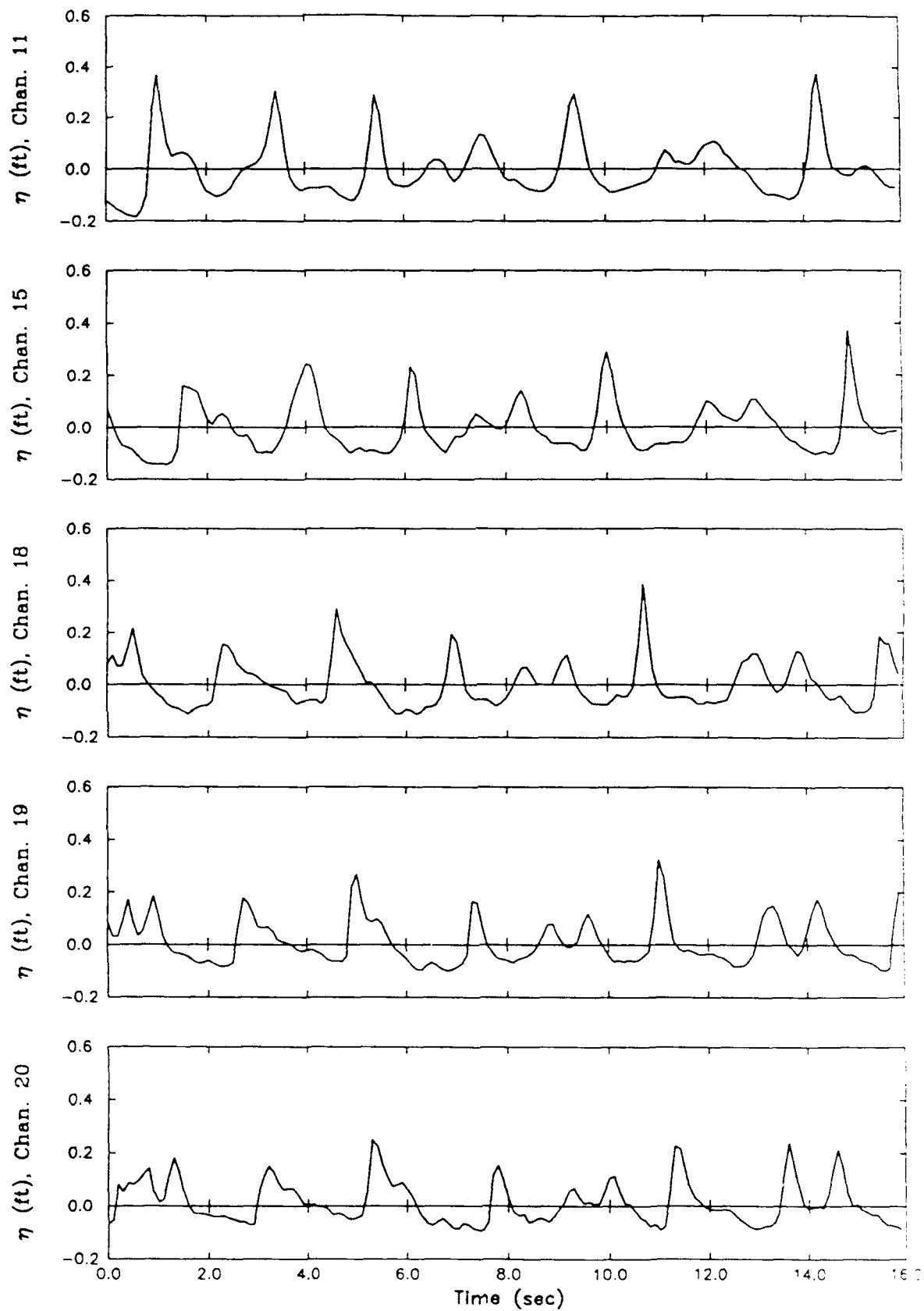


Generalized Beach Model, GBMS0105

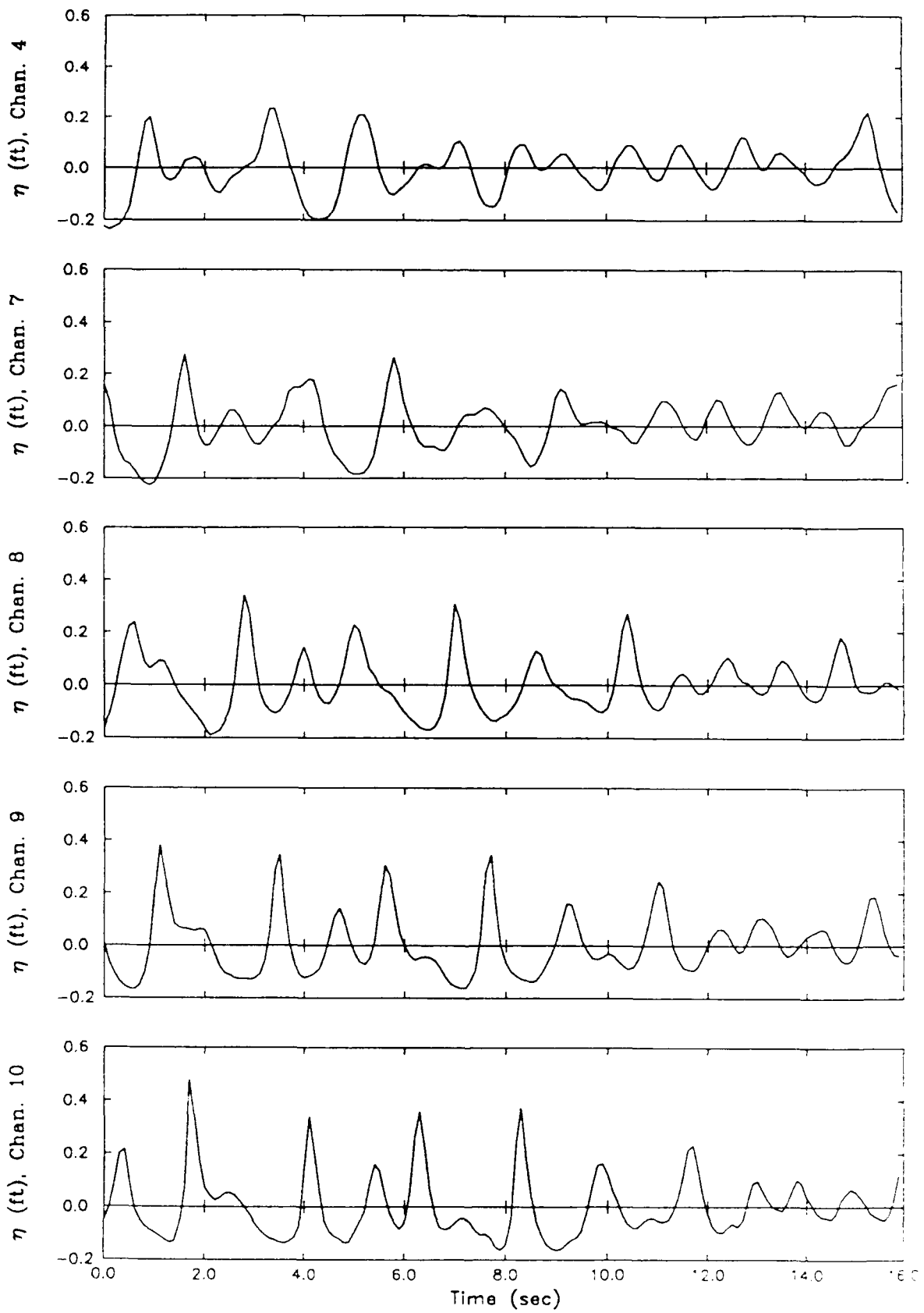




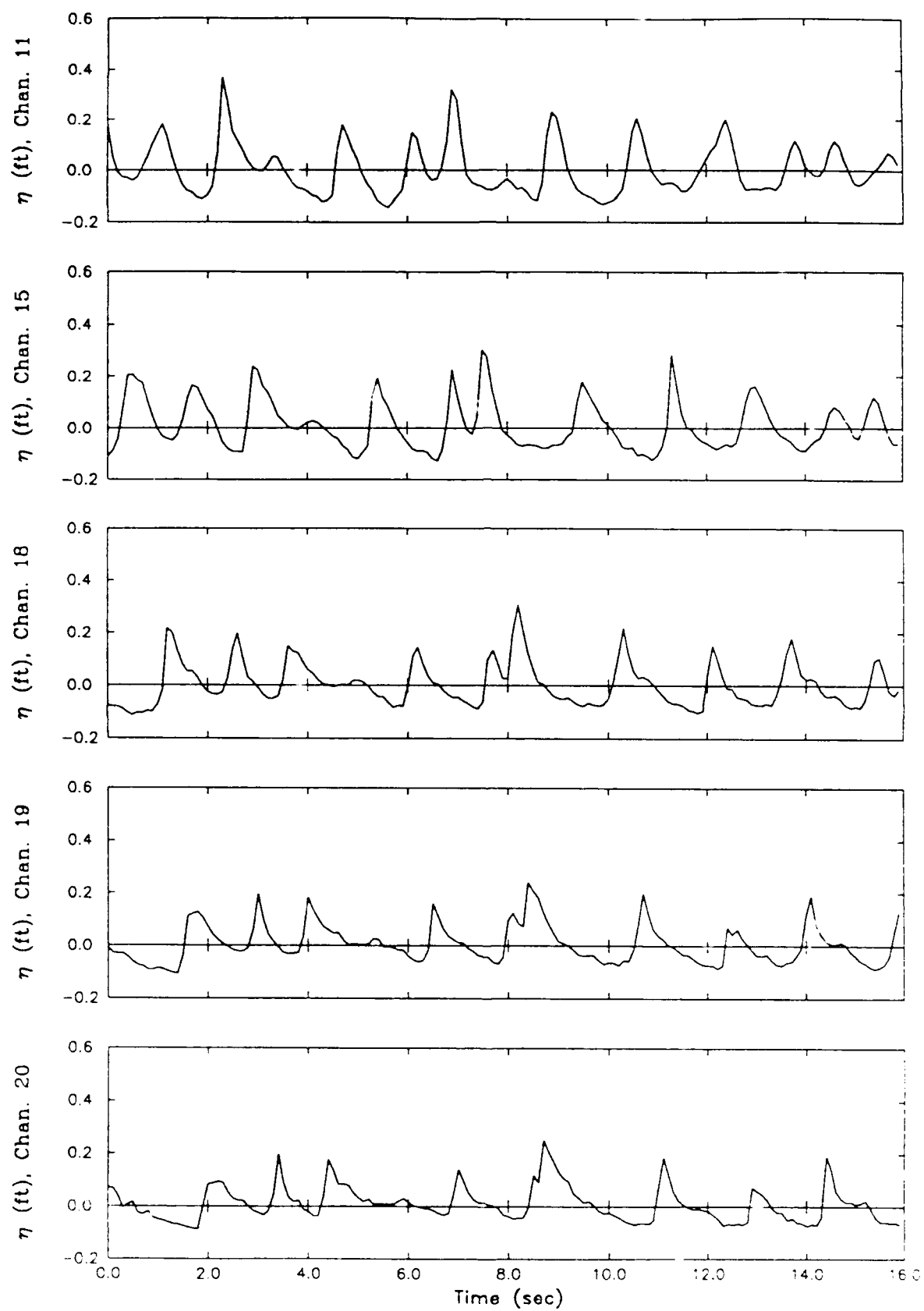
Generalized Beach Model, GBMS0905



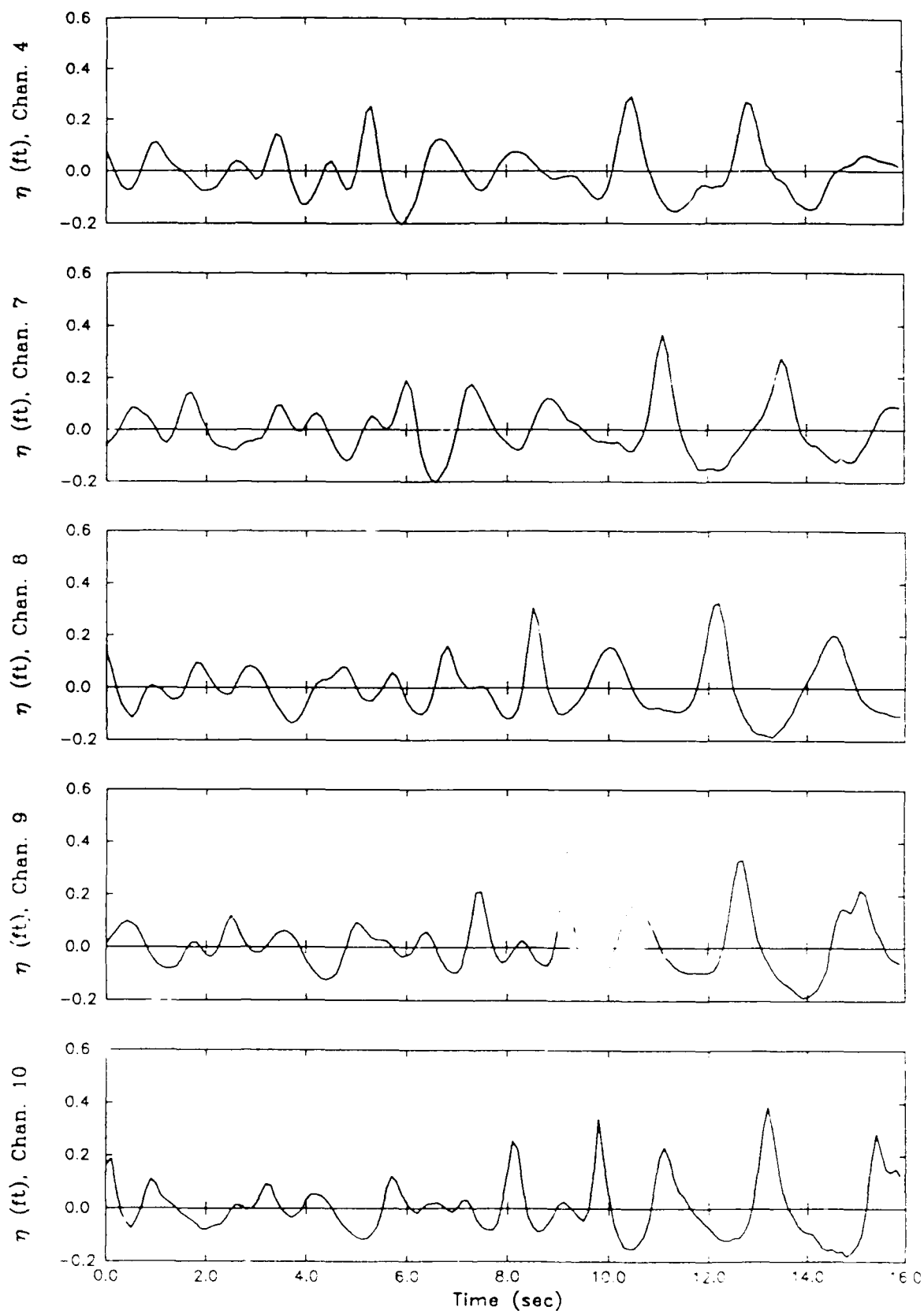
Generalized Beach Model, GBMS0905



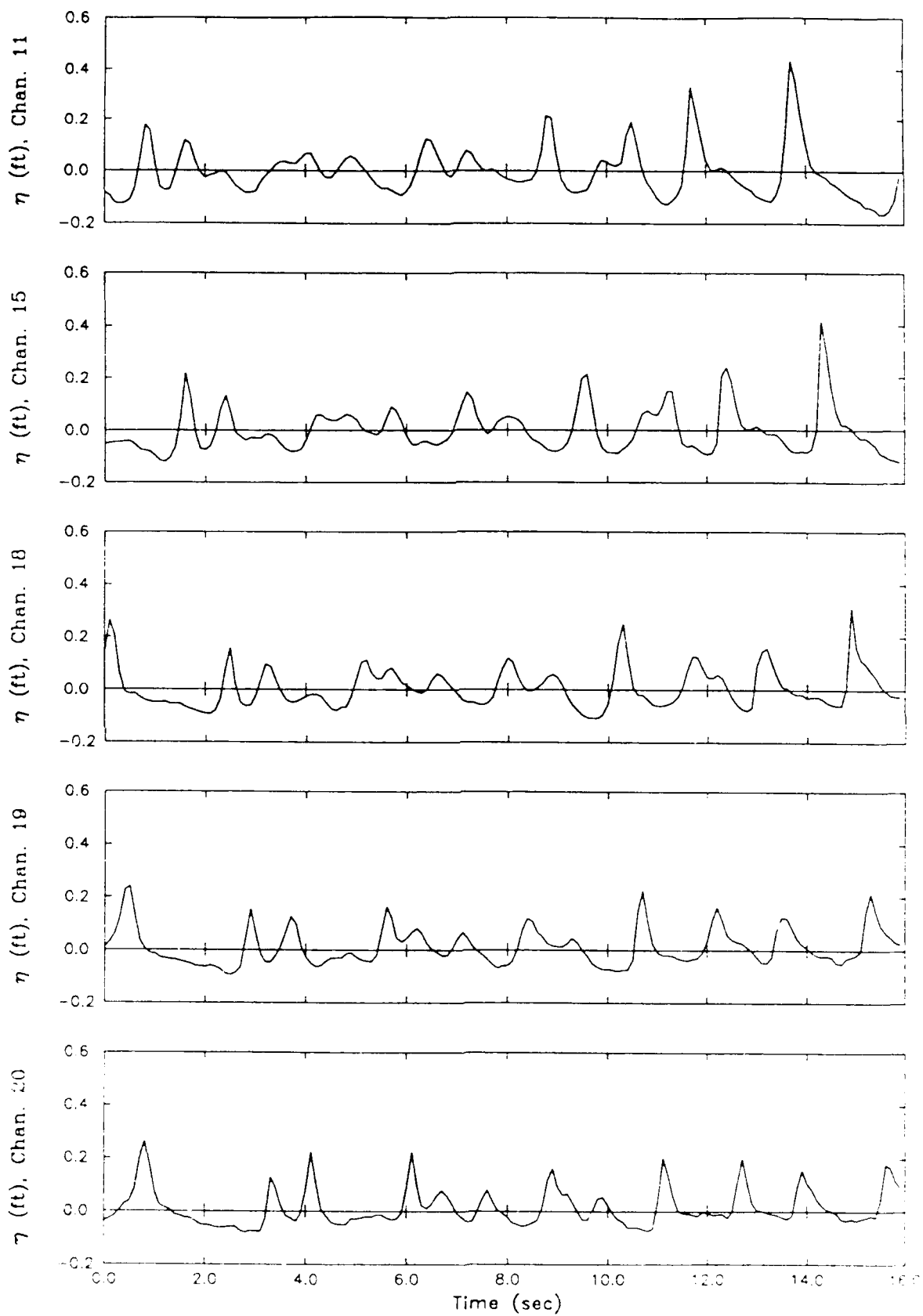
Generalized Beach Model, GBMS1305



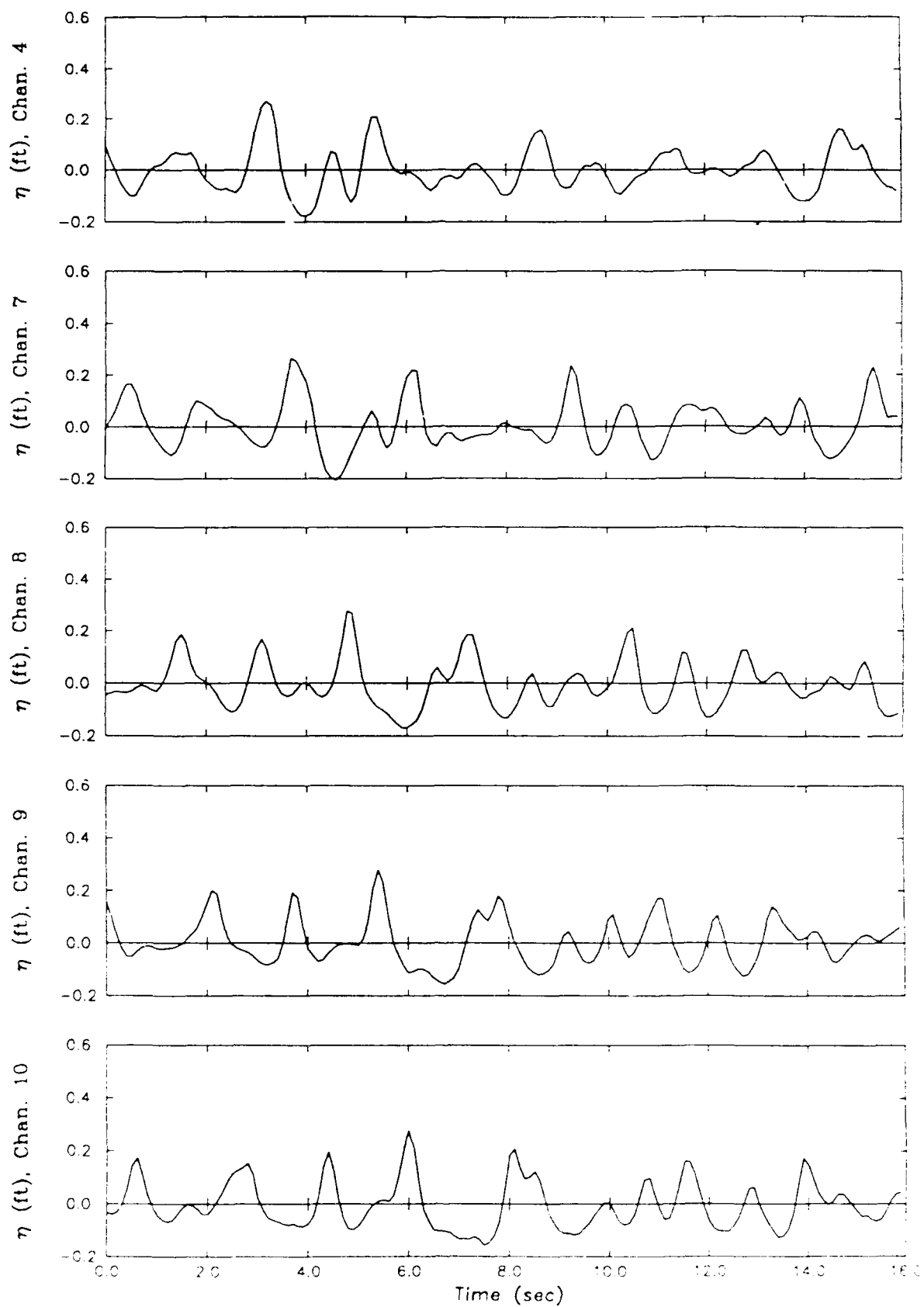
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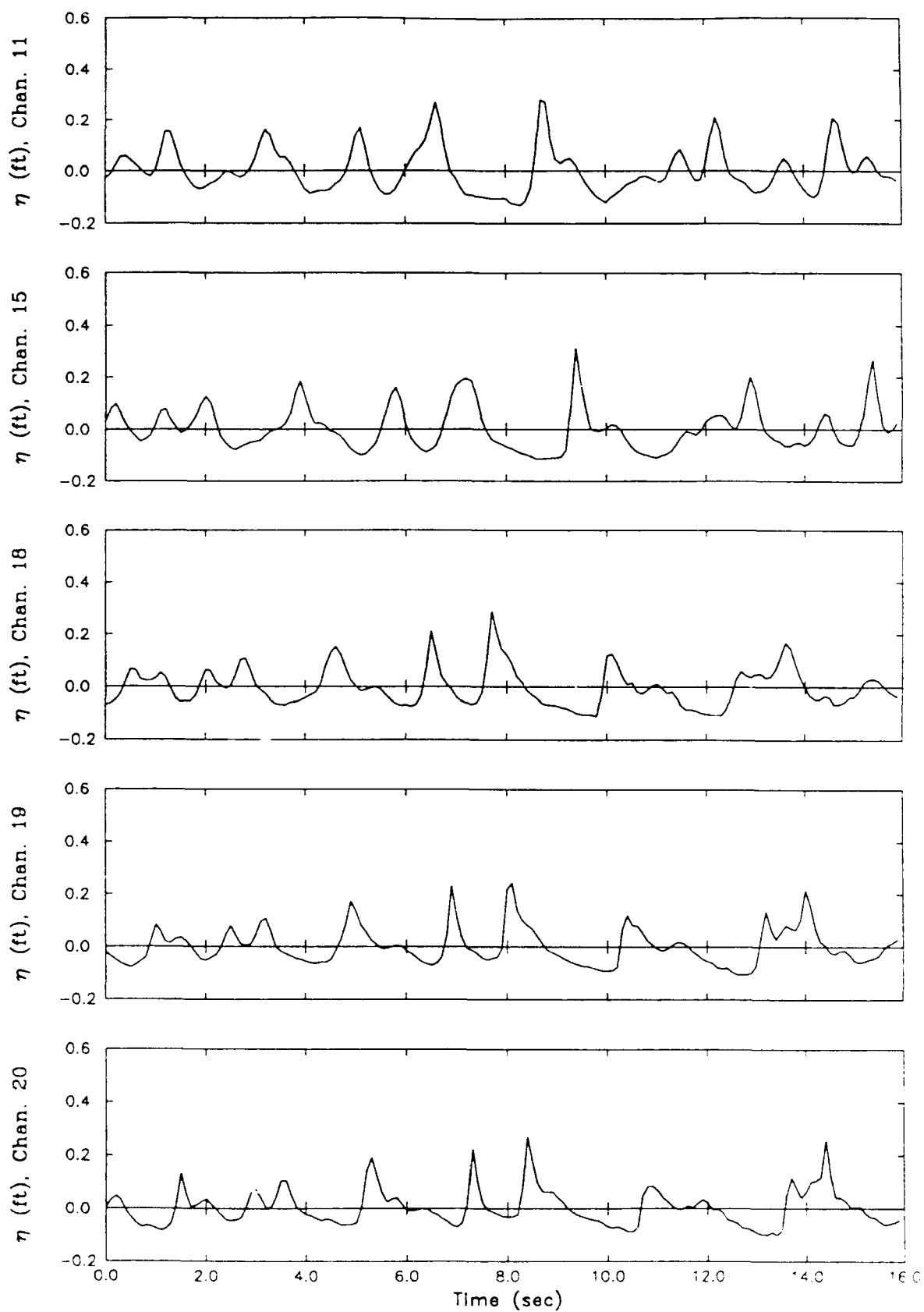
Generalized Beach Model, GBMS2105



Generalized Beach Model, GBMS2105

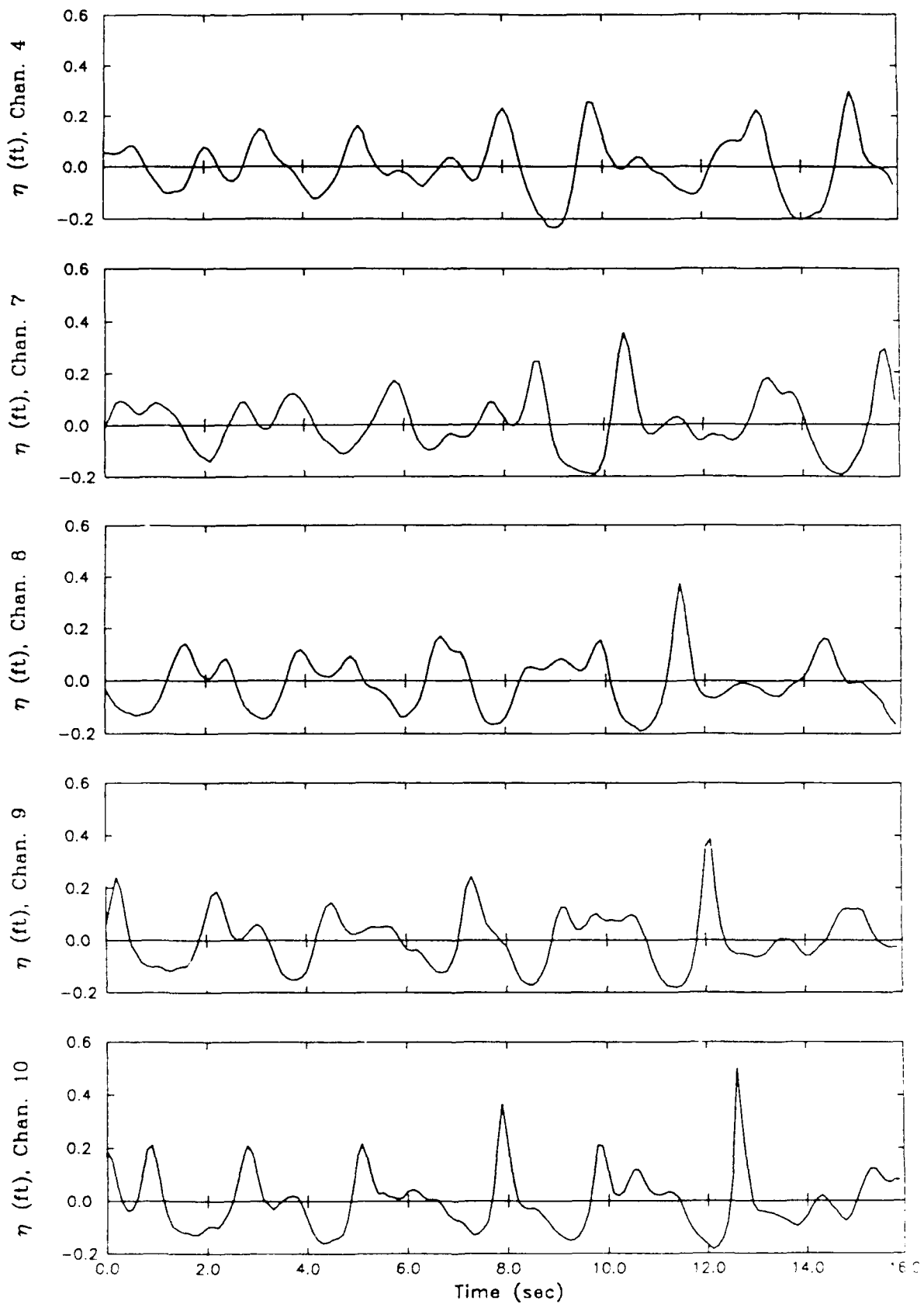


Generalized Beach Model, GBMS2505

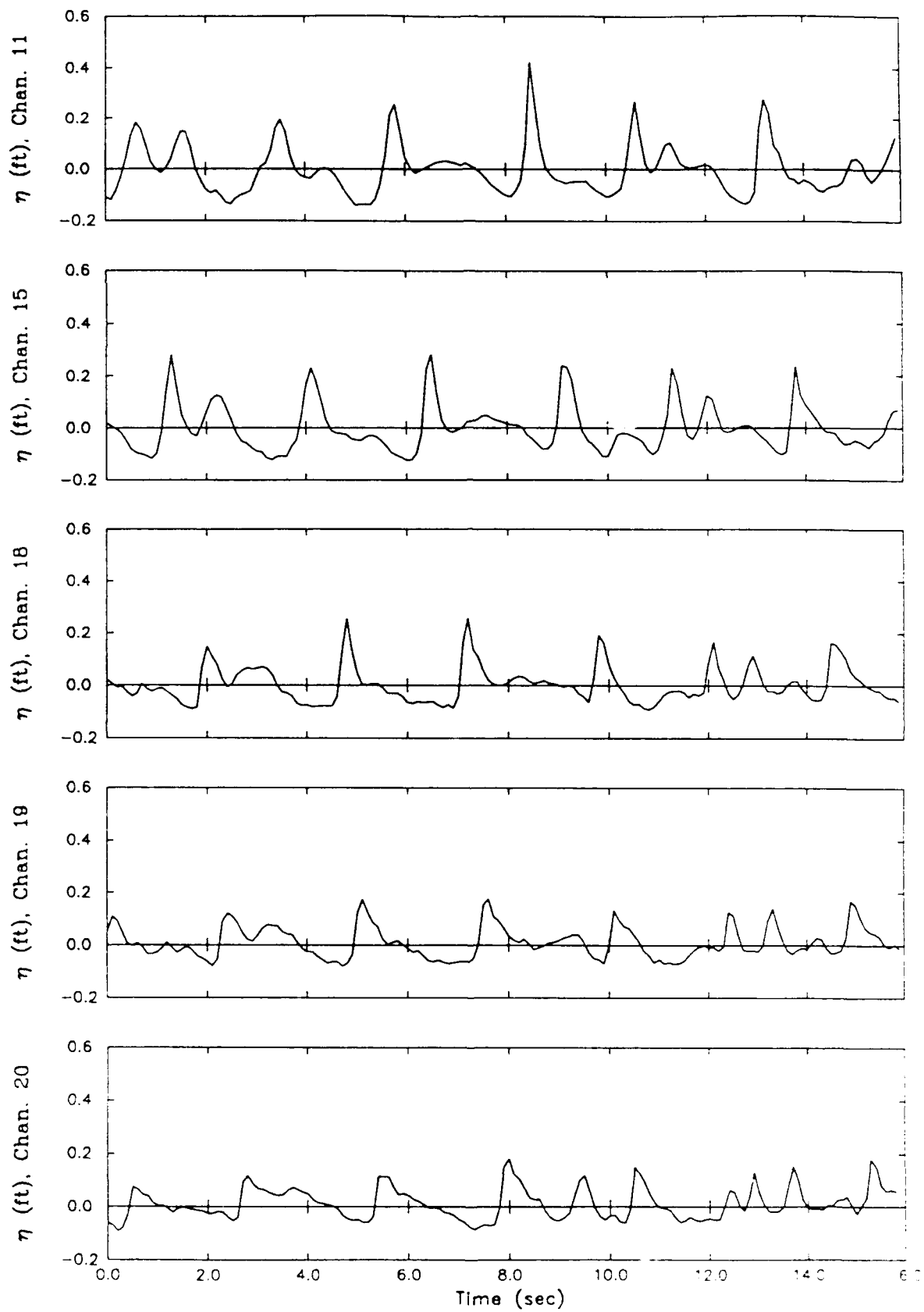


Generalized Beach Model, GBMS2505

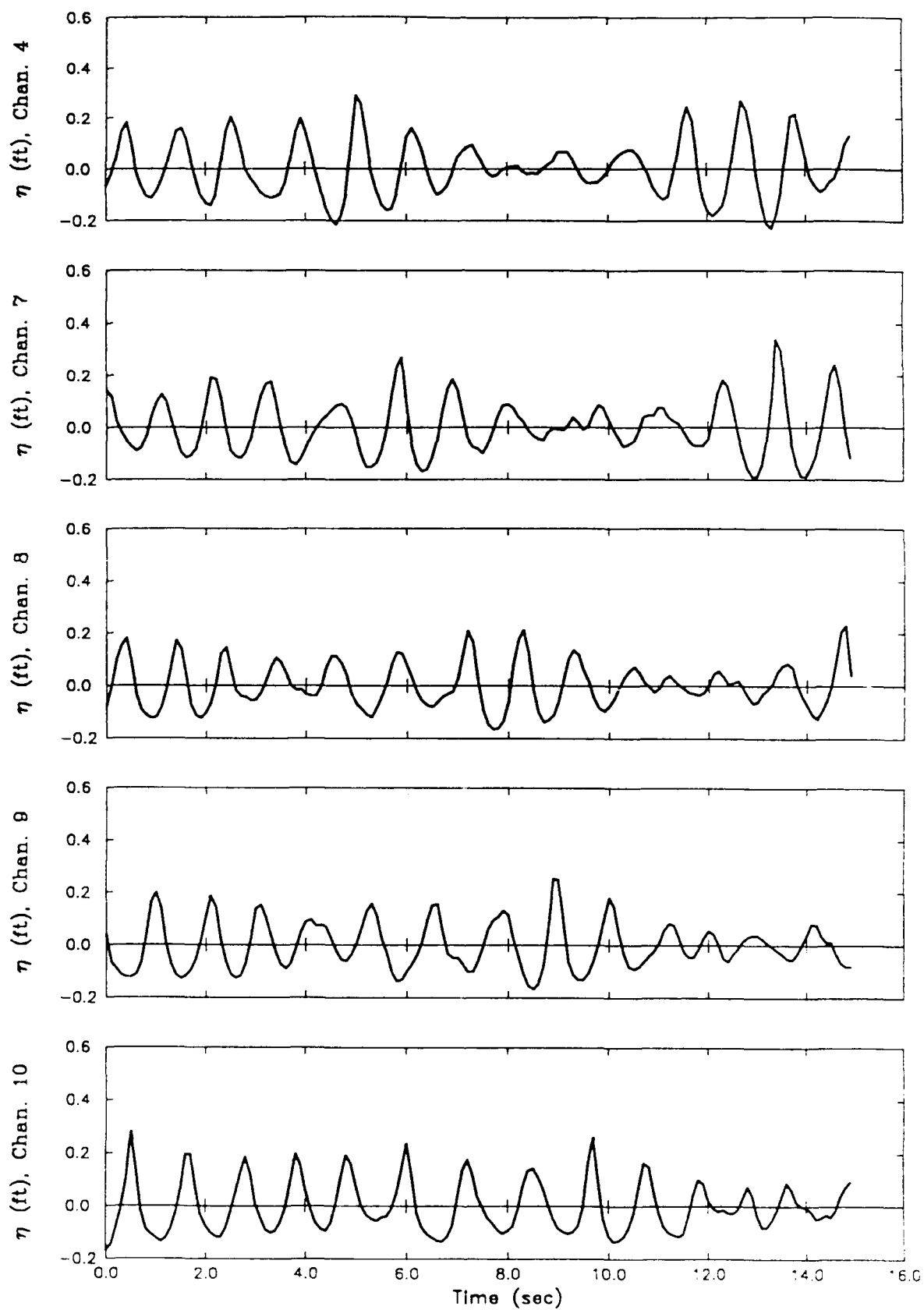




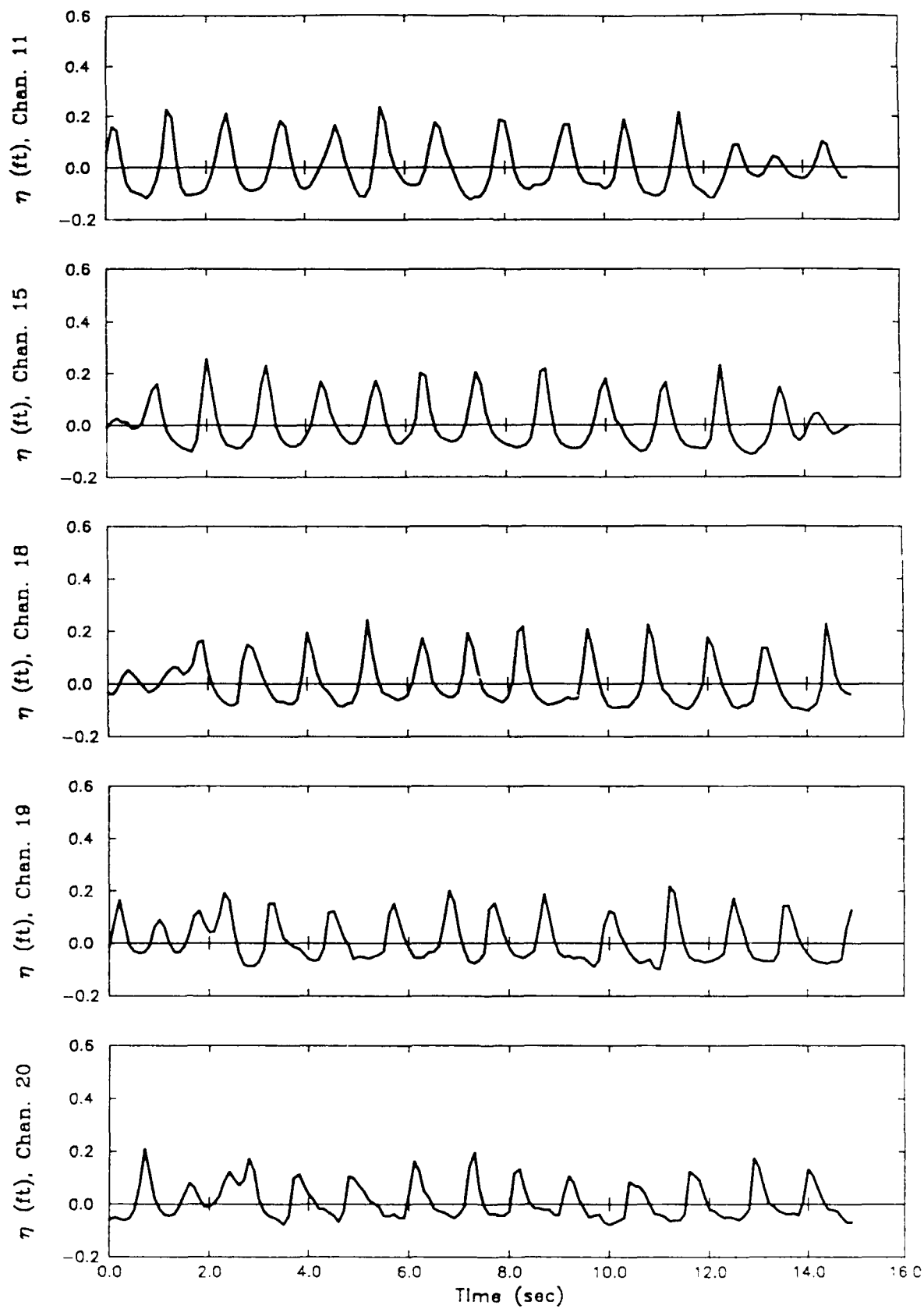
Generalized Beach Model, GBMS3305



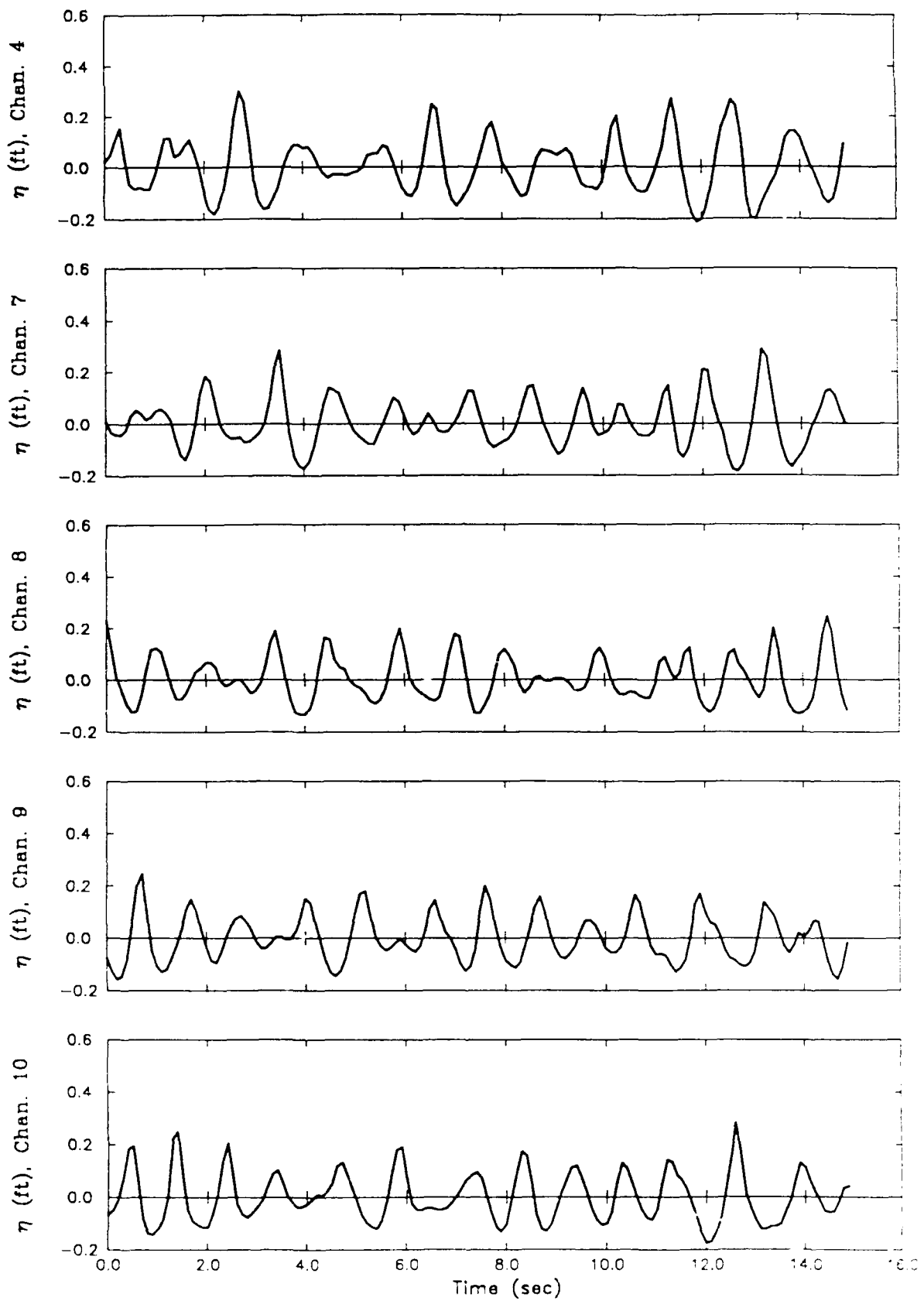
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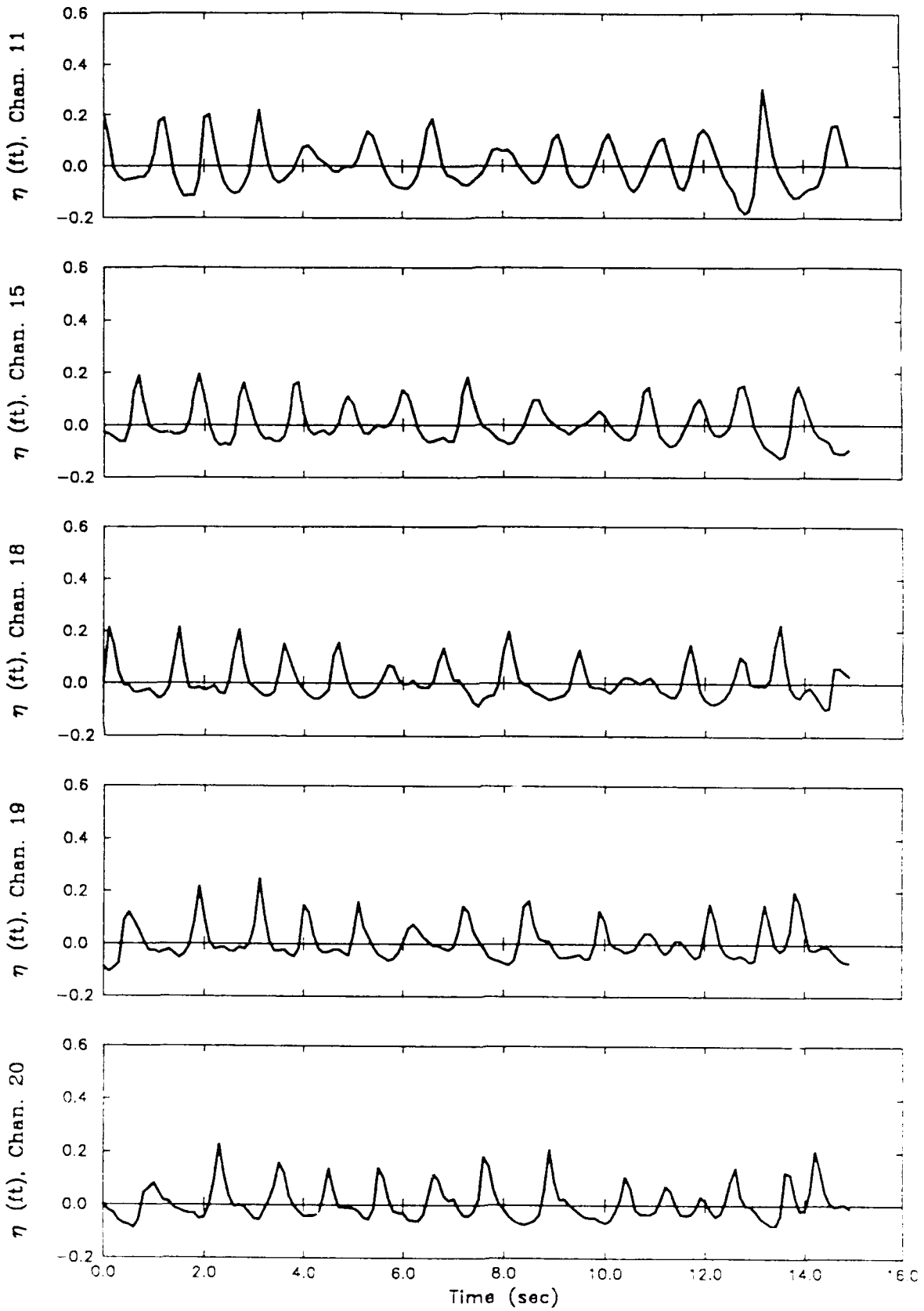
Generalized Beach Model, GBMS3705



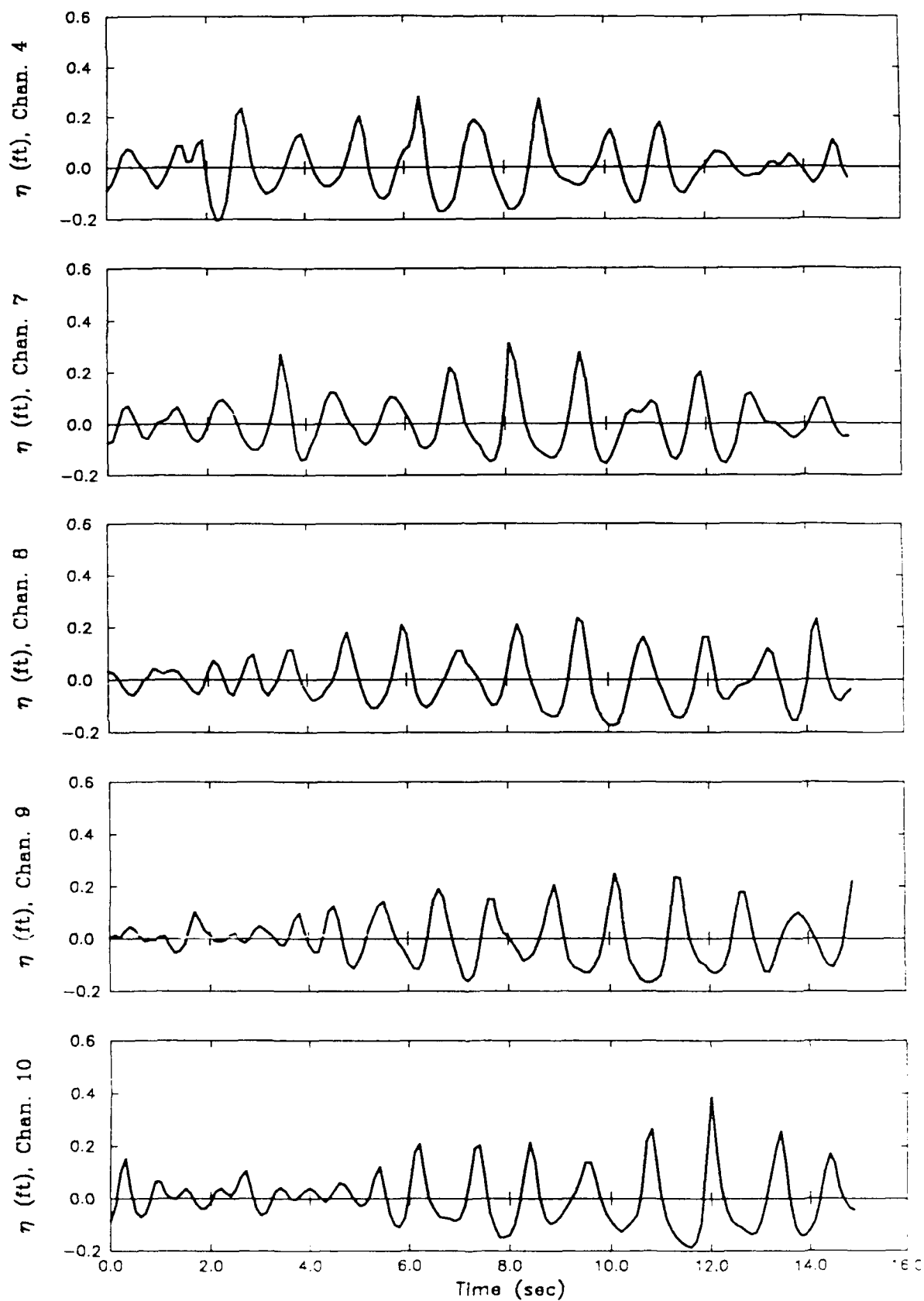
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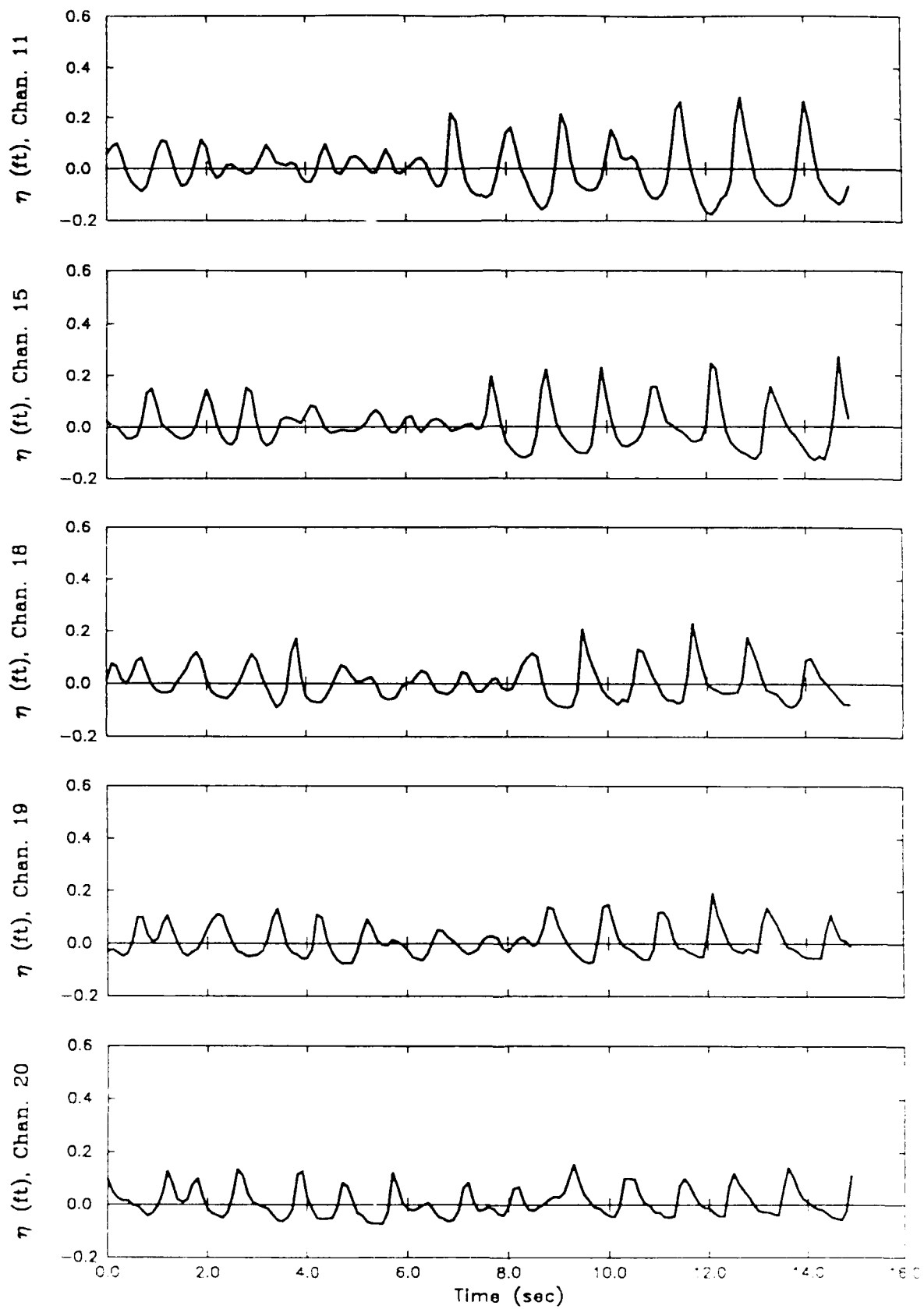
Generalized Beach Model, GBMS4505



Generalized Beach Model, GBMS4505

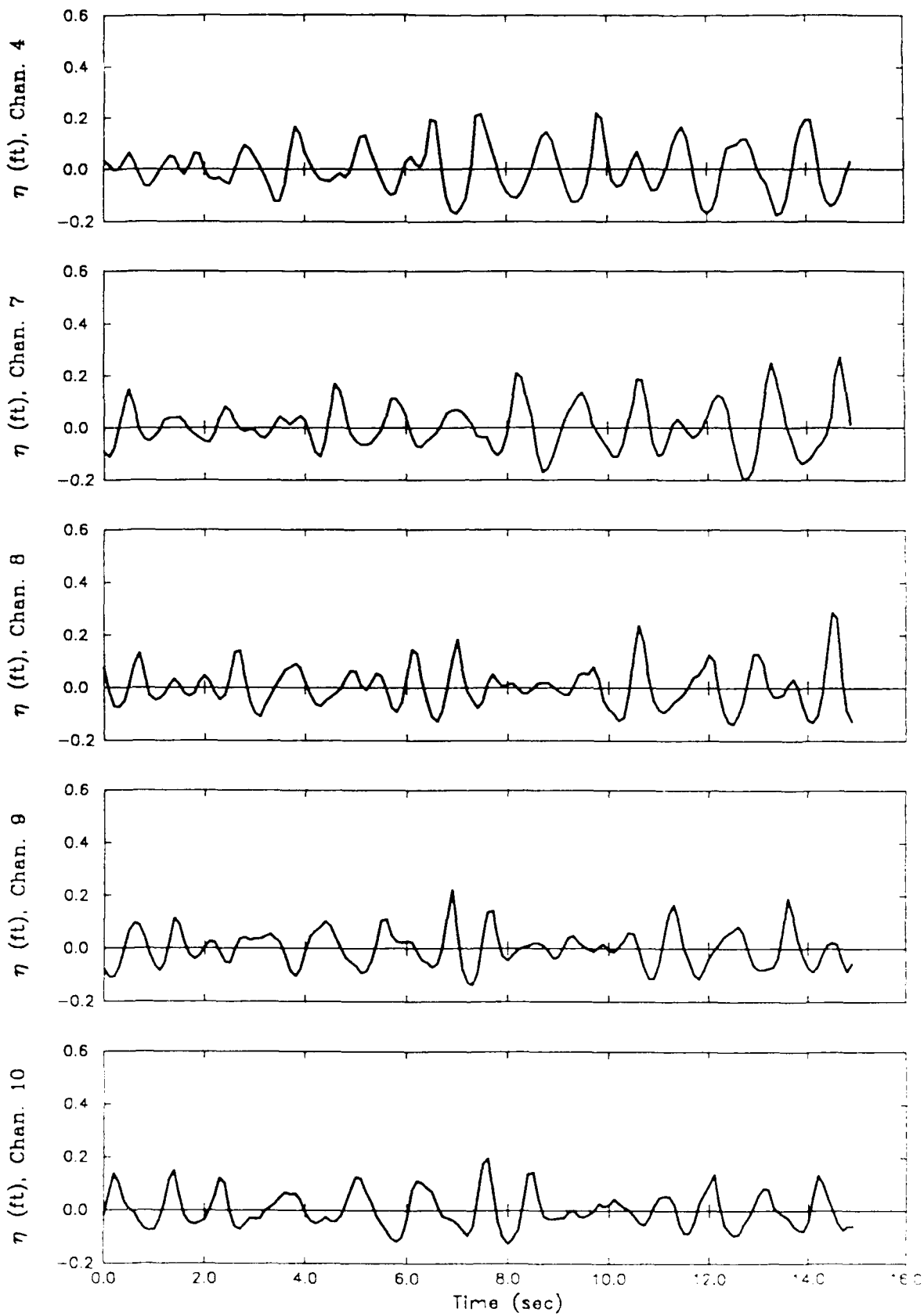


Generalized Beach Model, GBMS4905

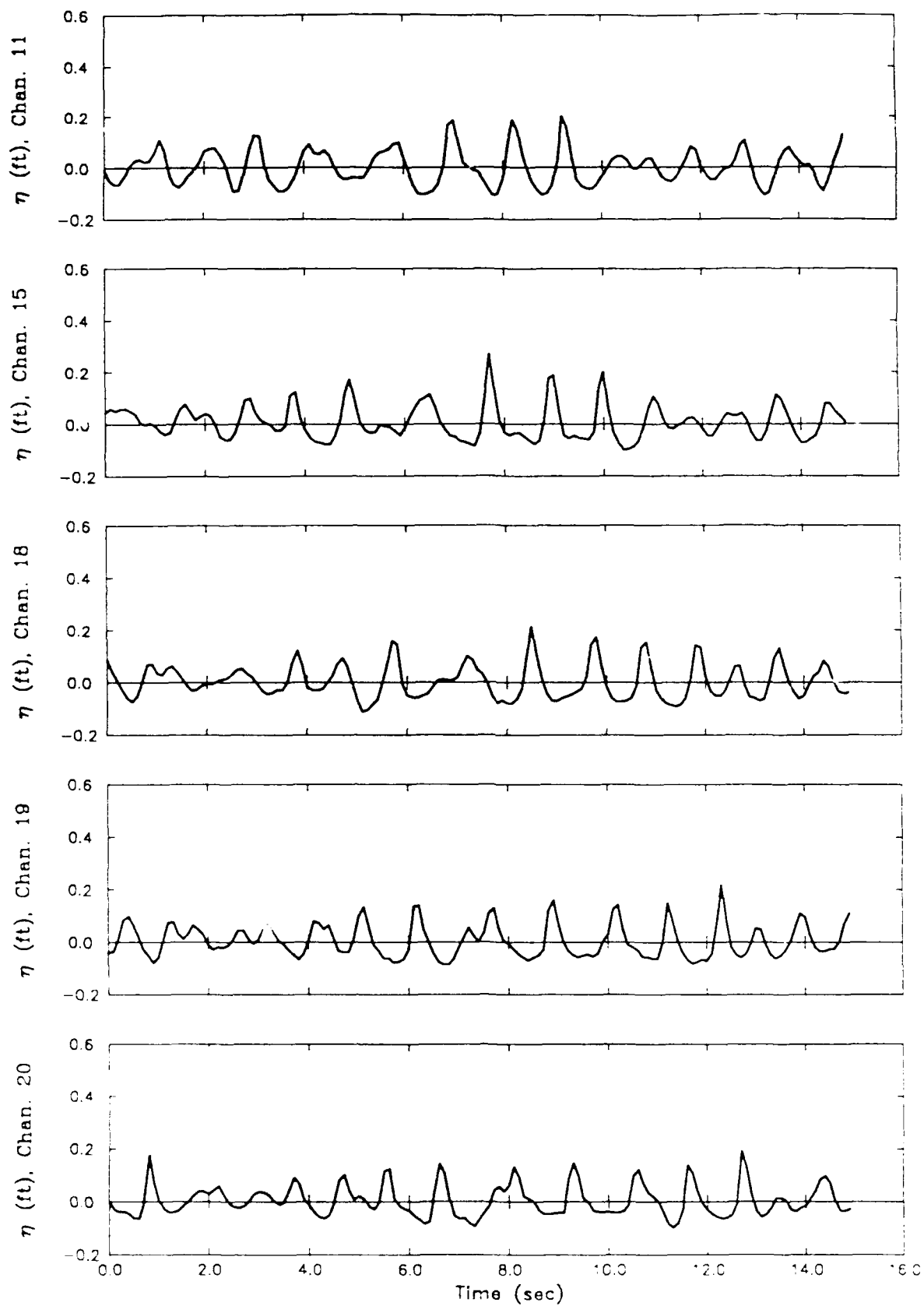


Generalized Beach Model, GBMS4905

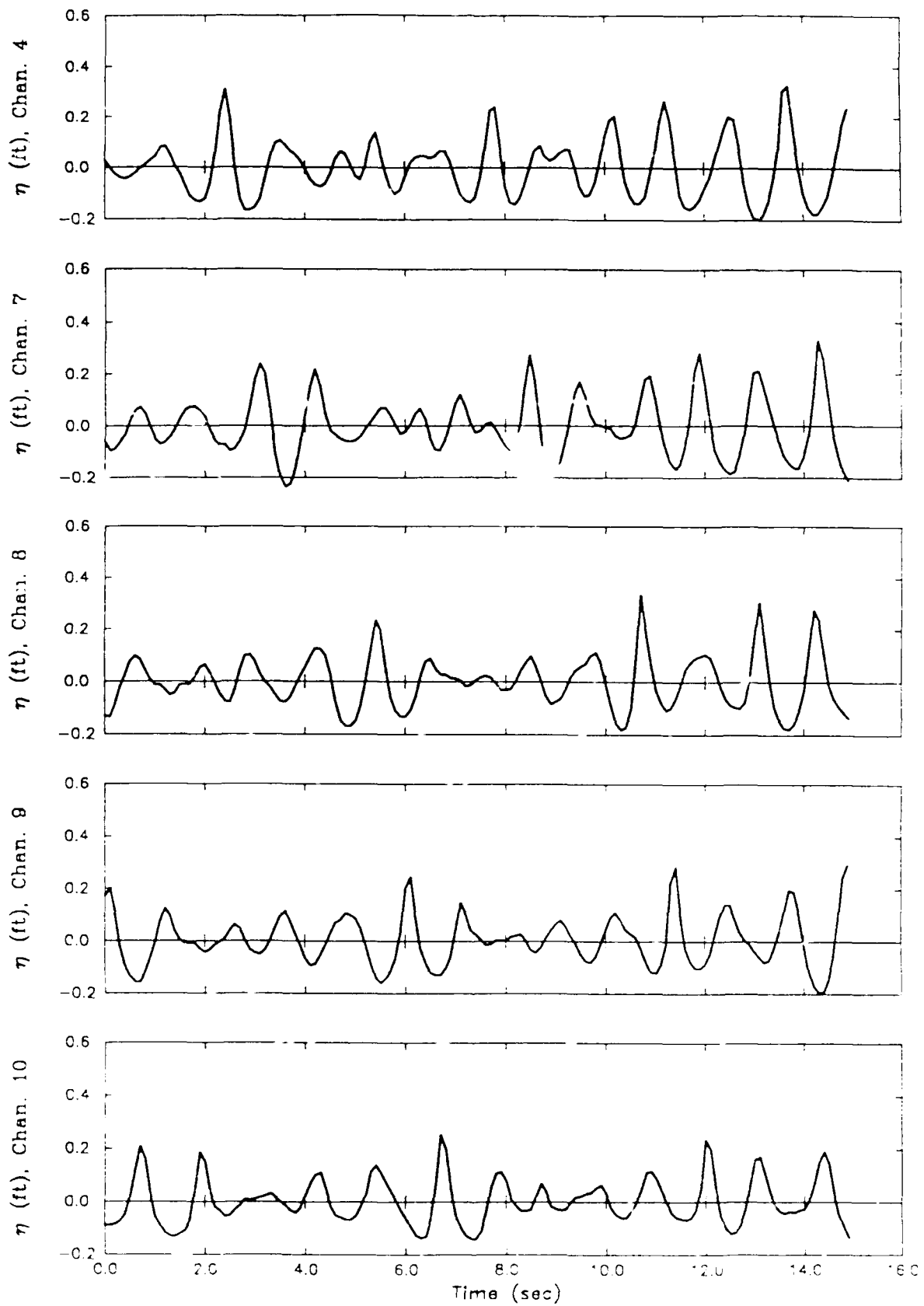




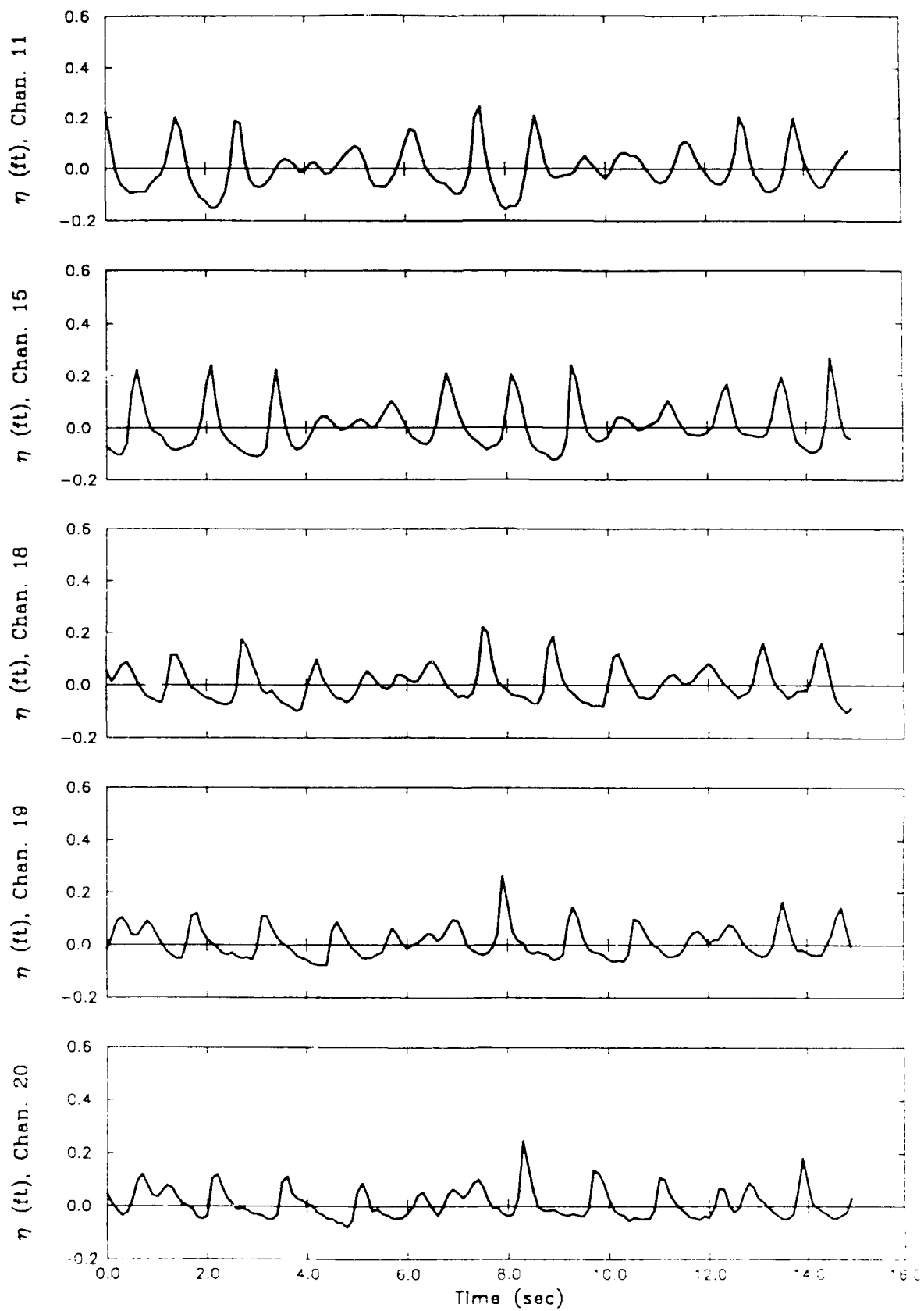
Generalized Beach Model, GBMS5705



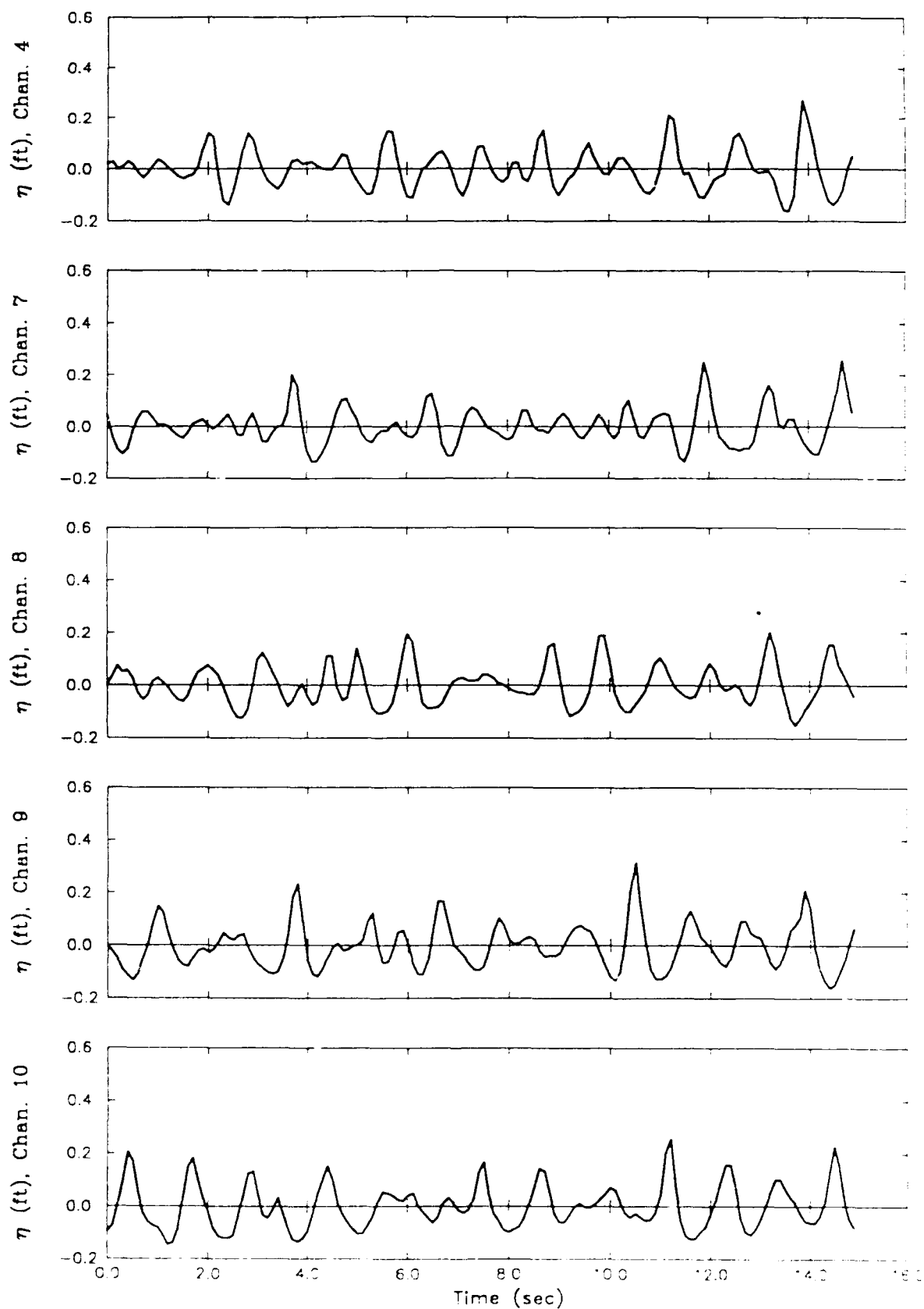
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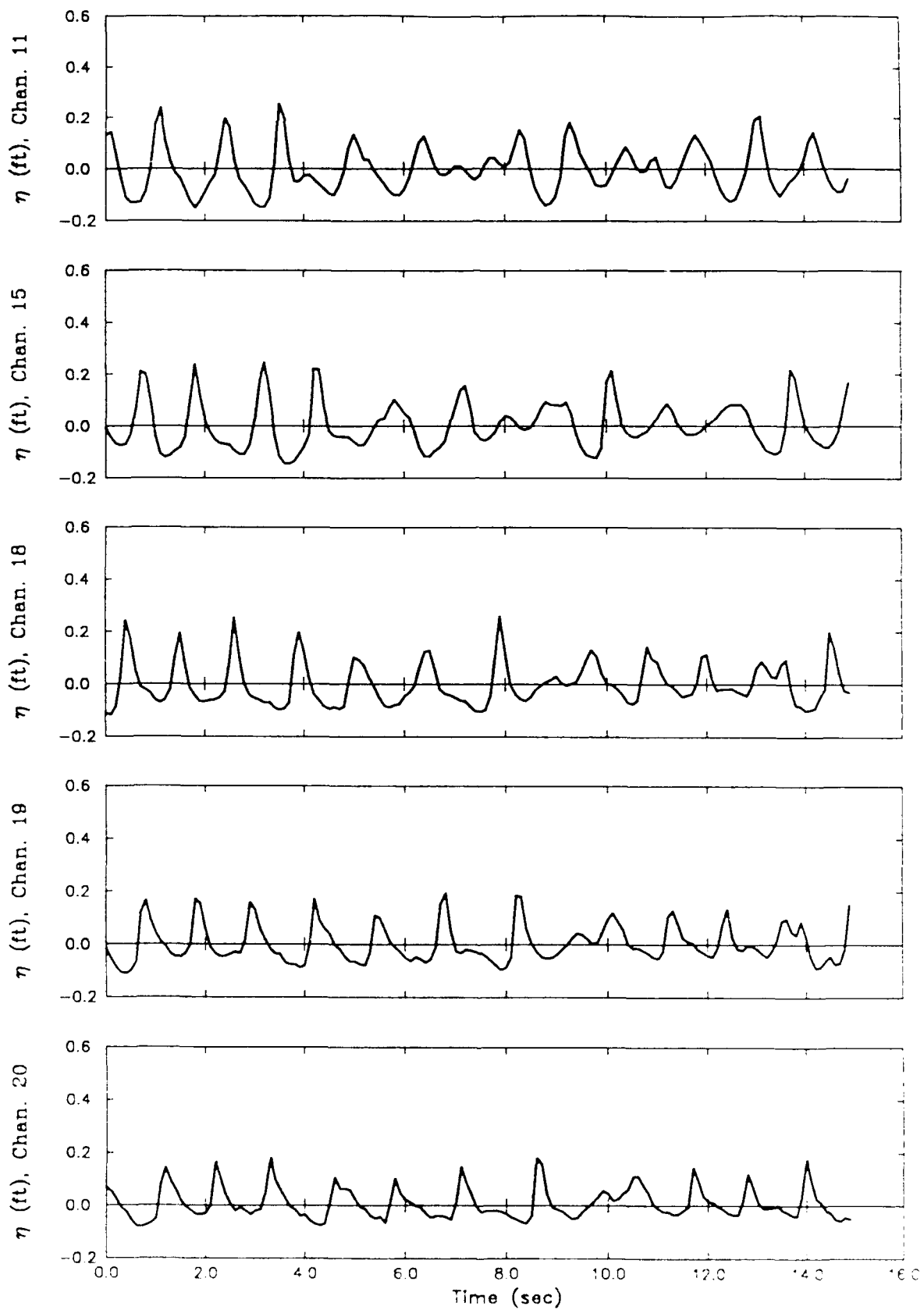
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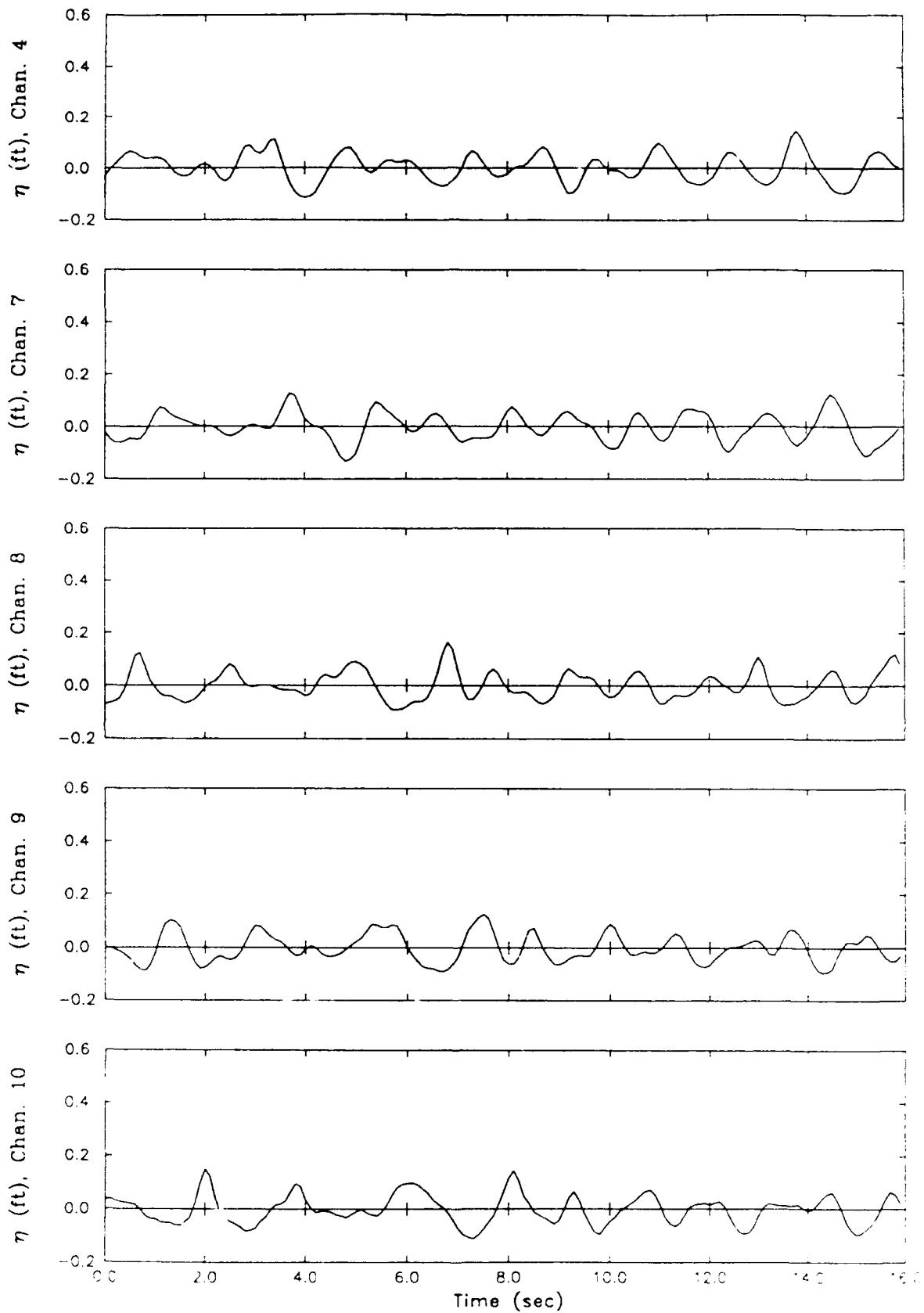
Generalized Beach Model, GBMS6105



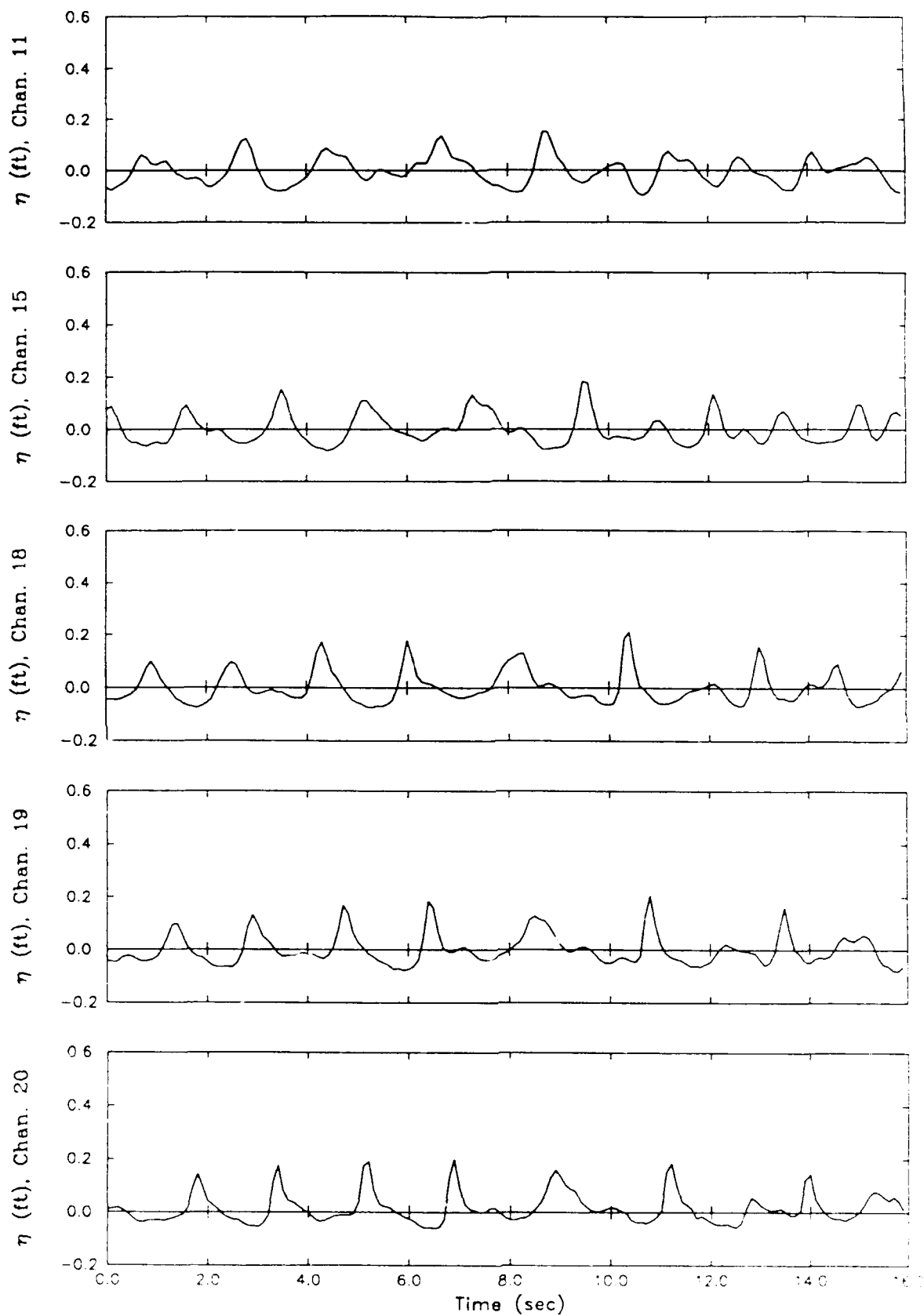
Generalized Beach Model, GBMS6905



Generalized Beach Model, GBMS6905

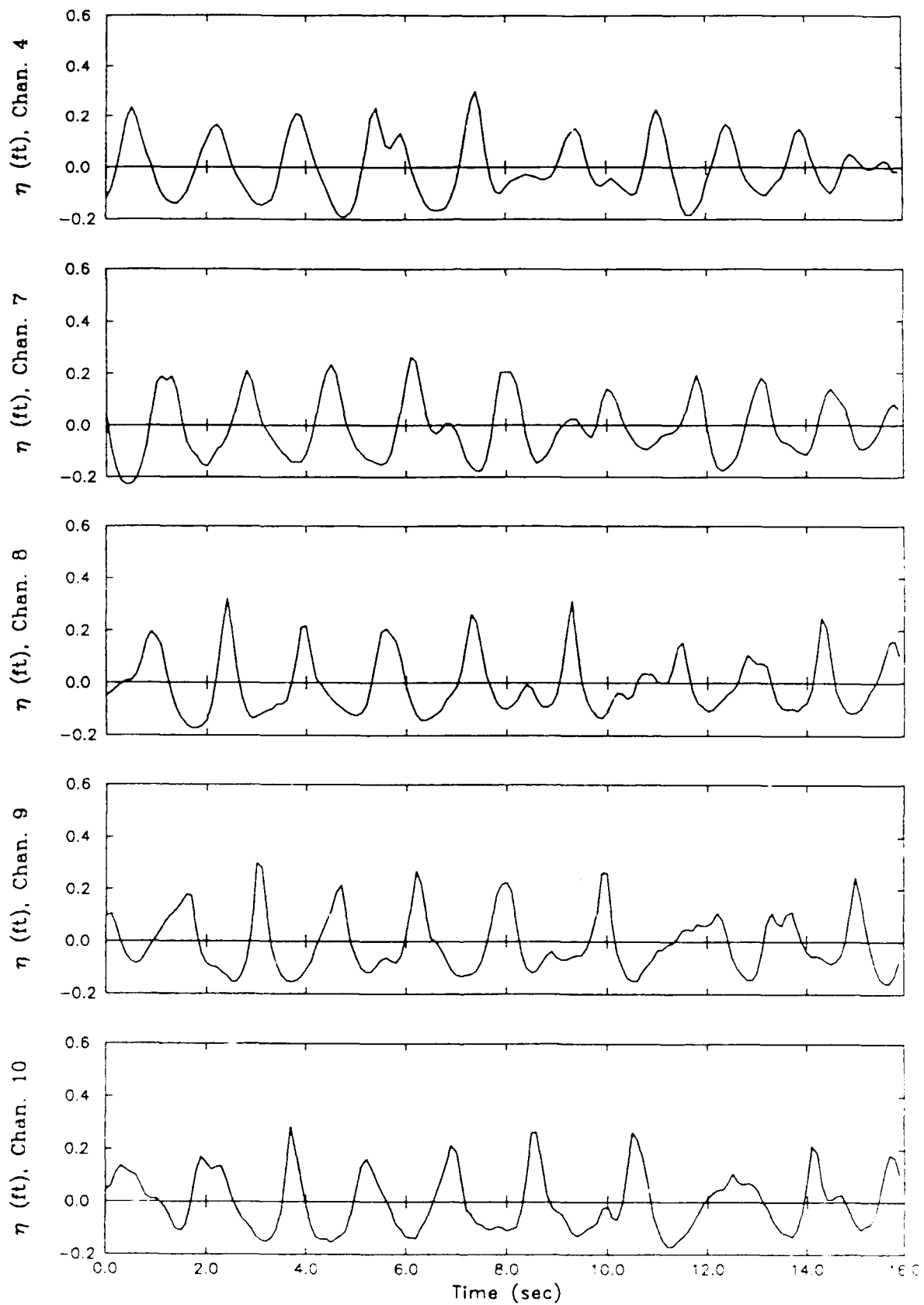


Generalized Beach Model, GBMD0104

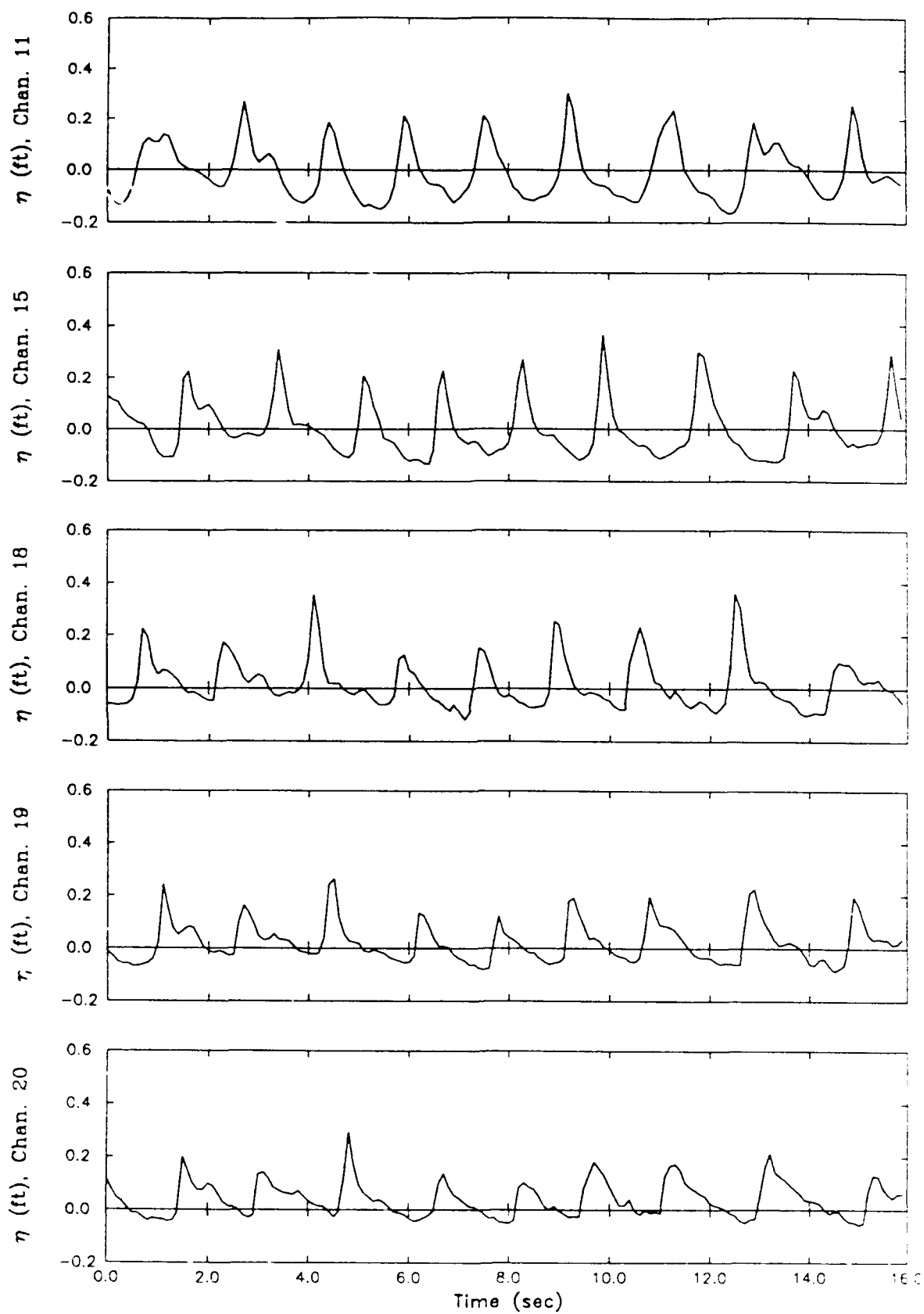


Generalized Beach Model, GBMD0104

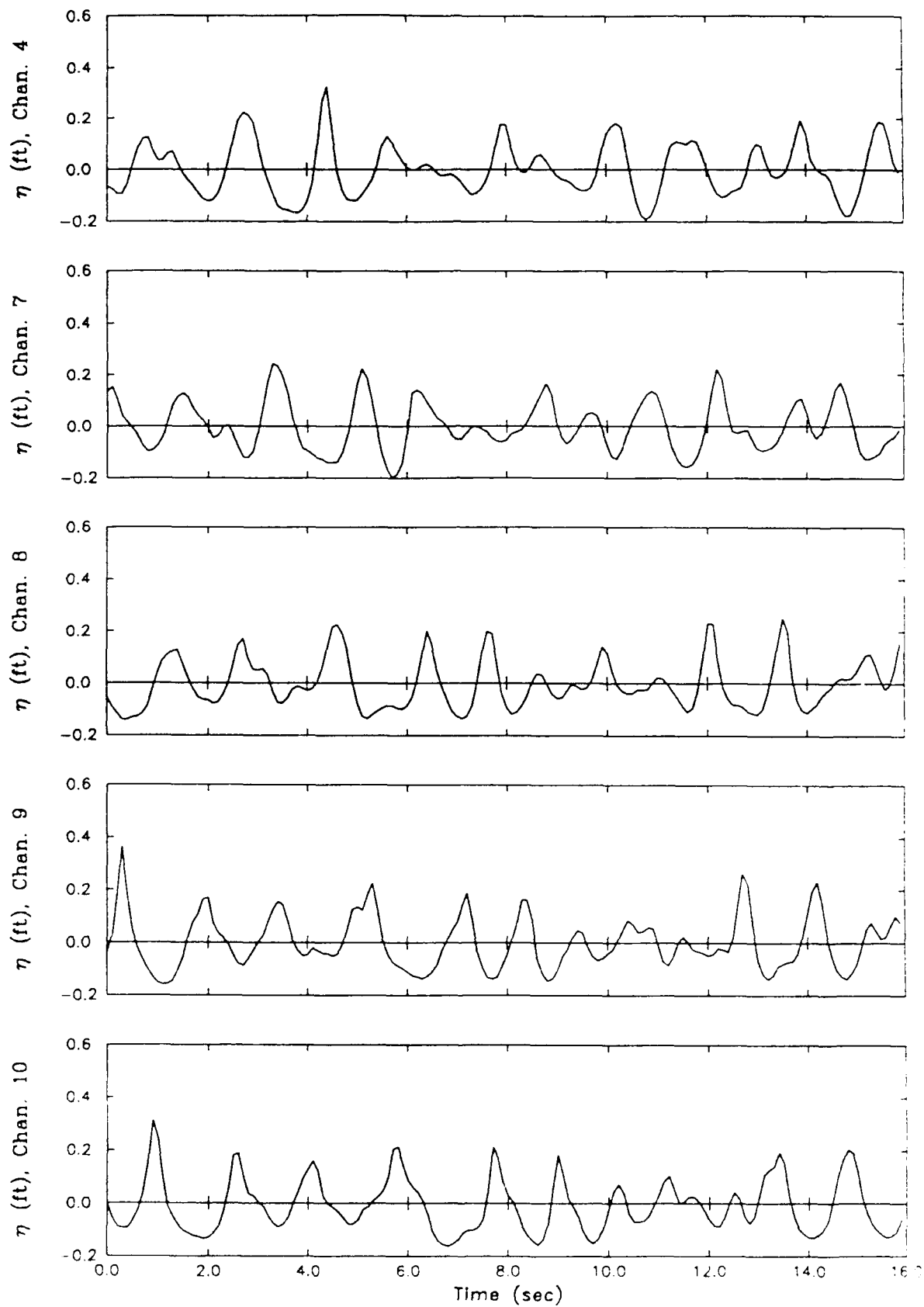




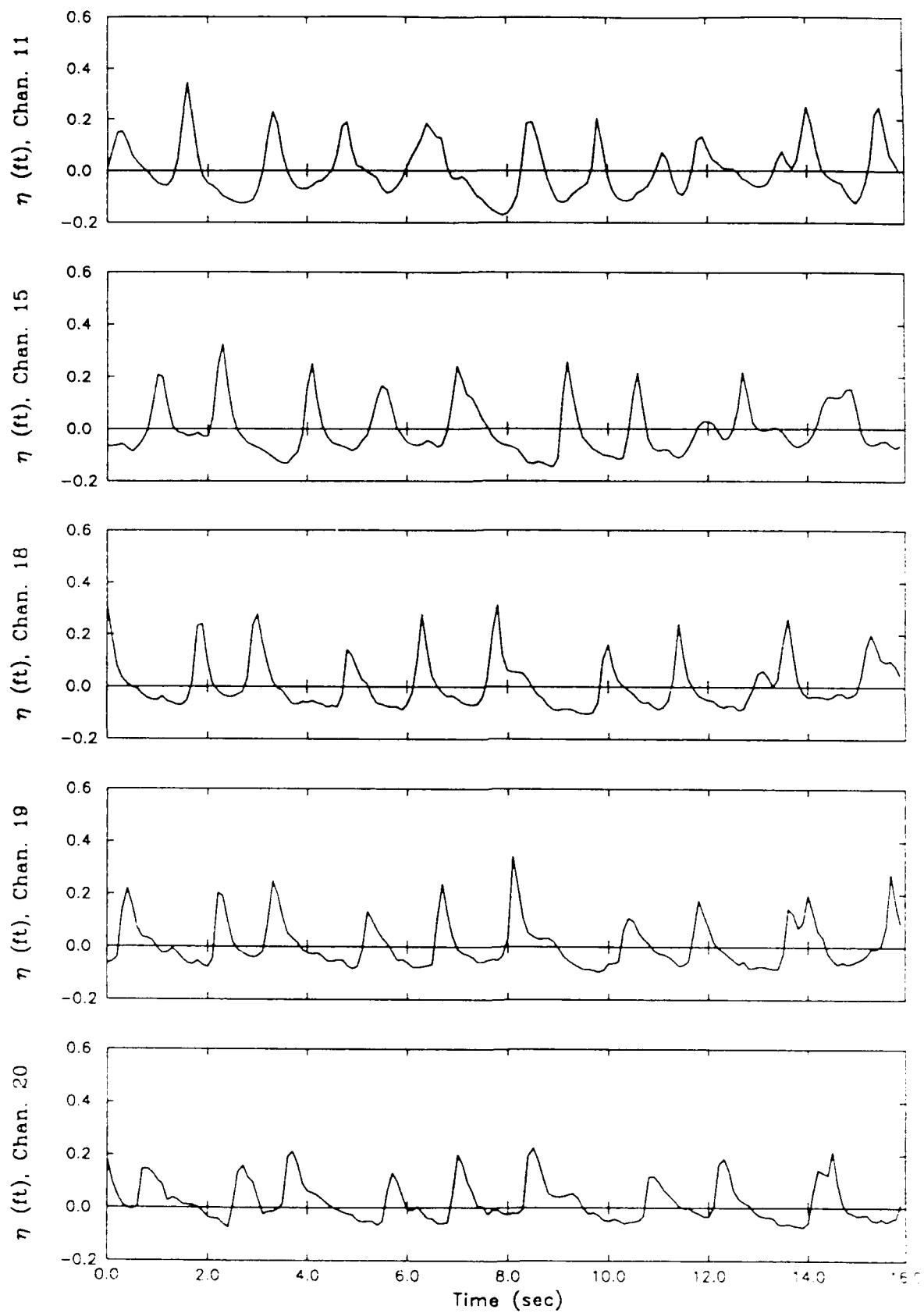
Generalized Beach Model, GBMD0203



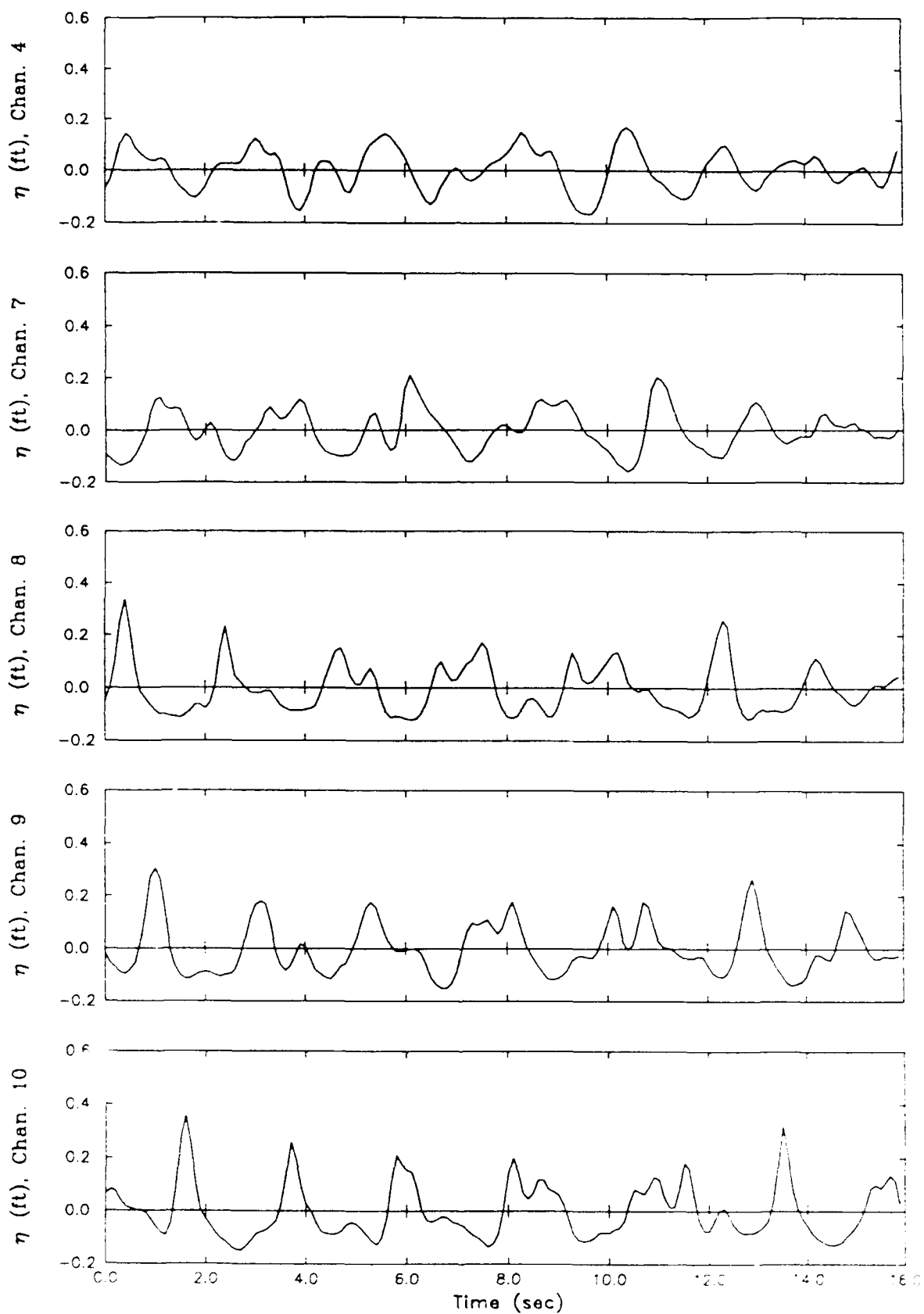
Generalized Beach Model, GBMD0203



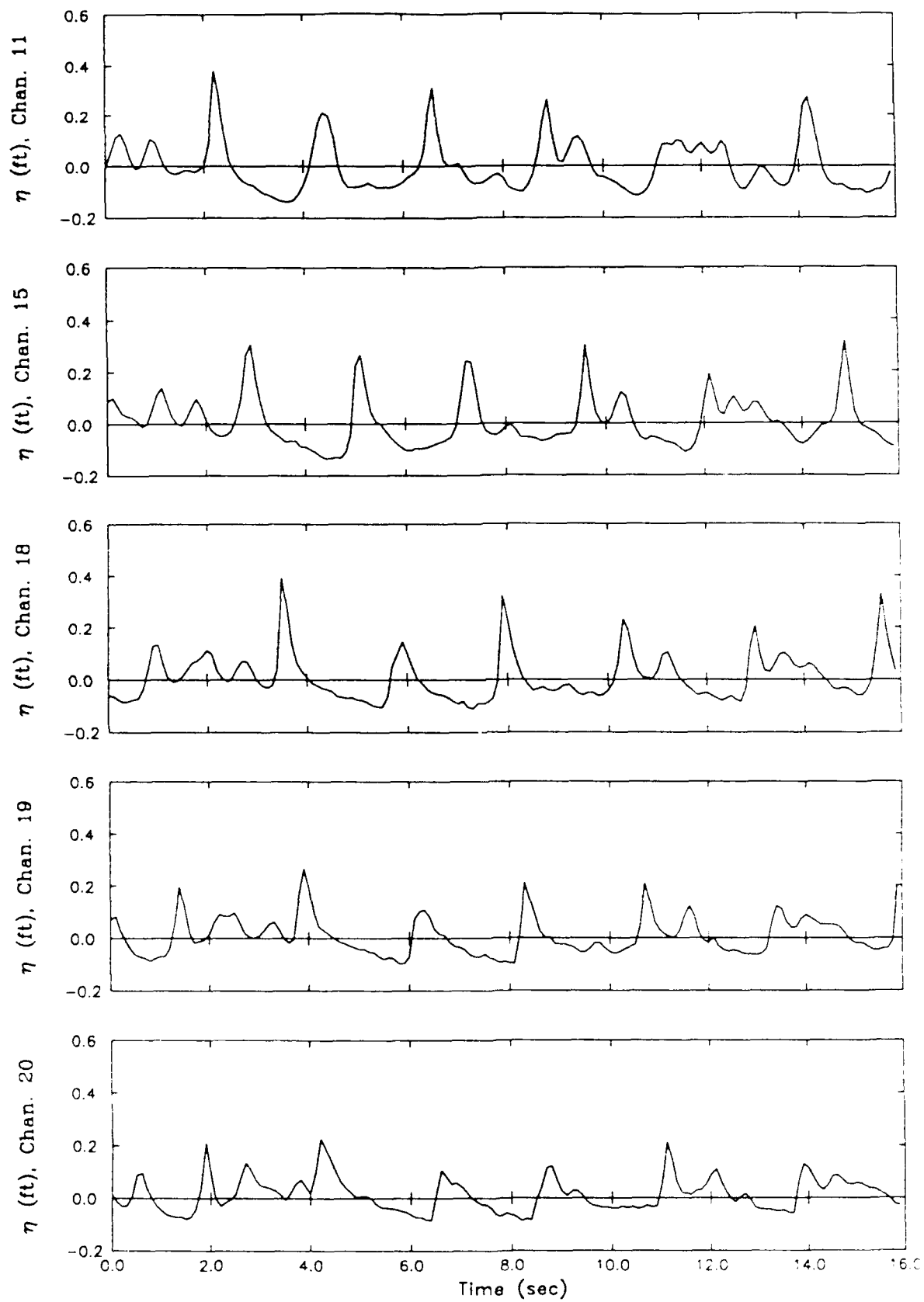
Generalized Beach Model, GBMD0303



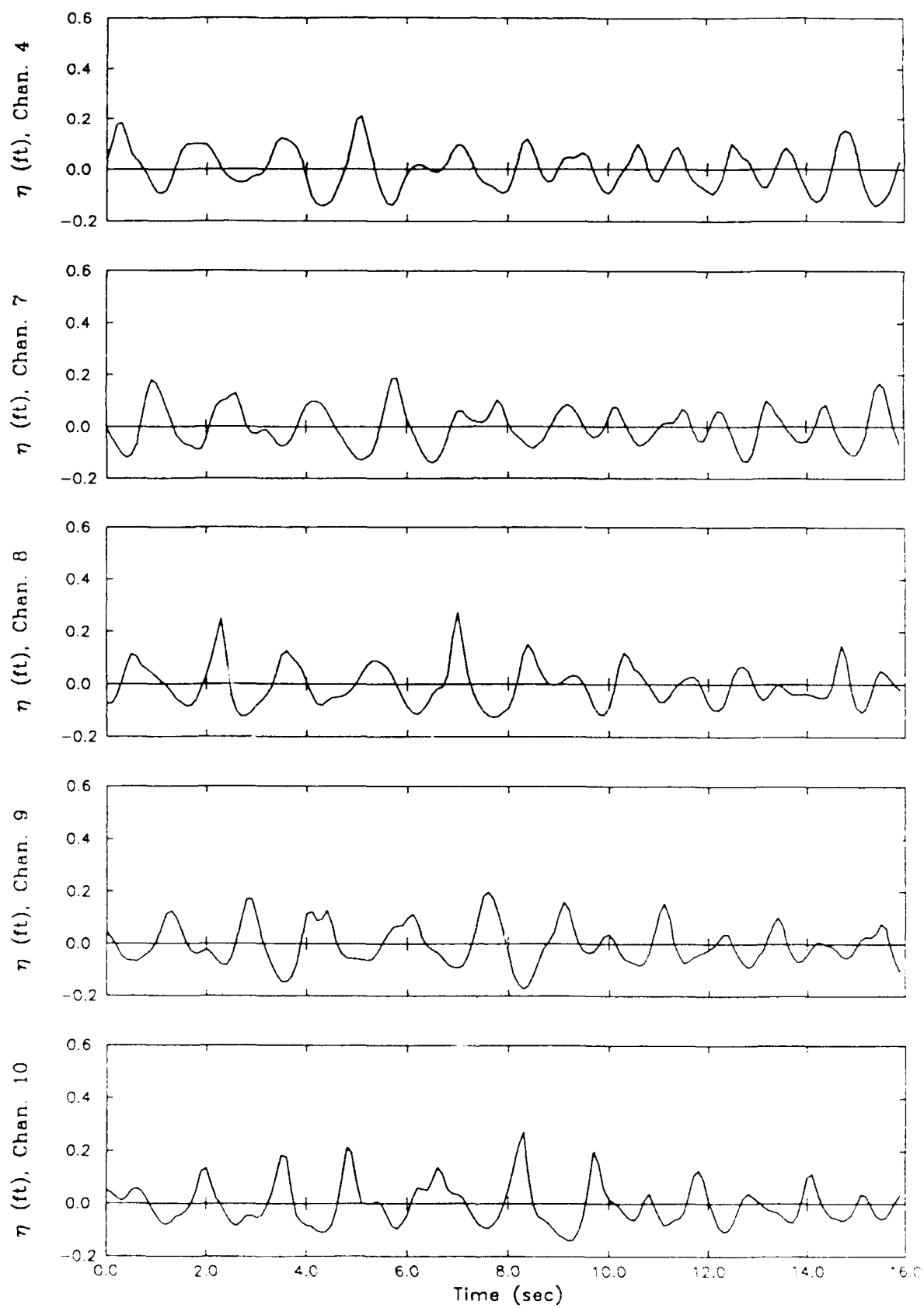
Generalized Beach Model, GBMD0303



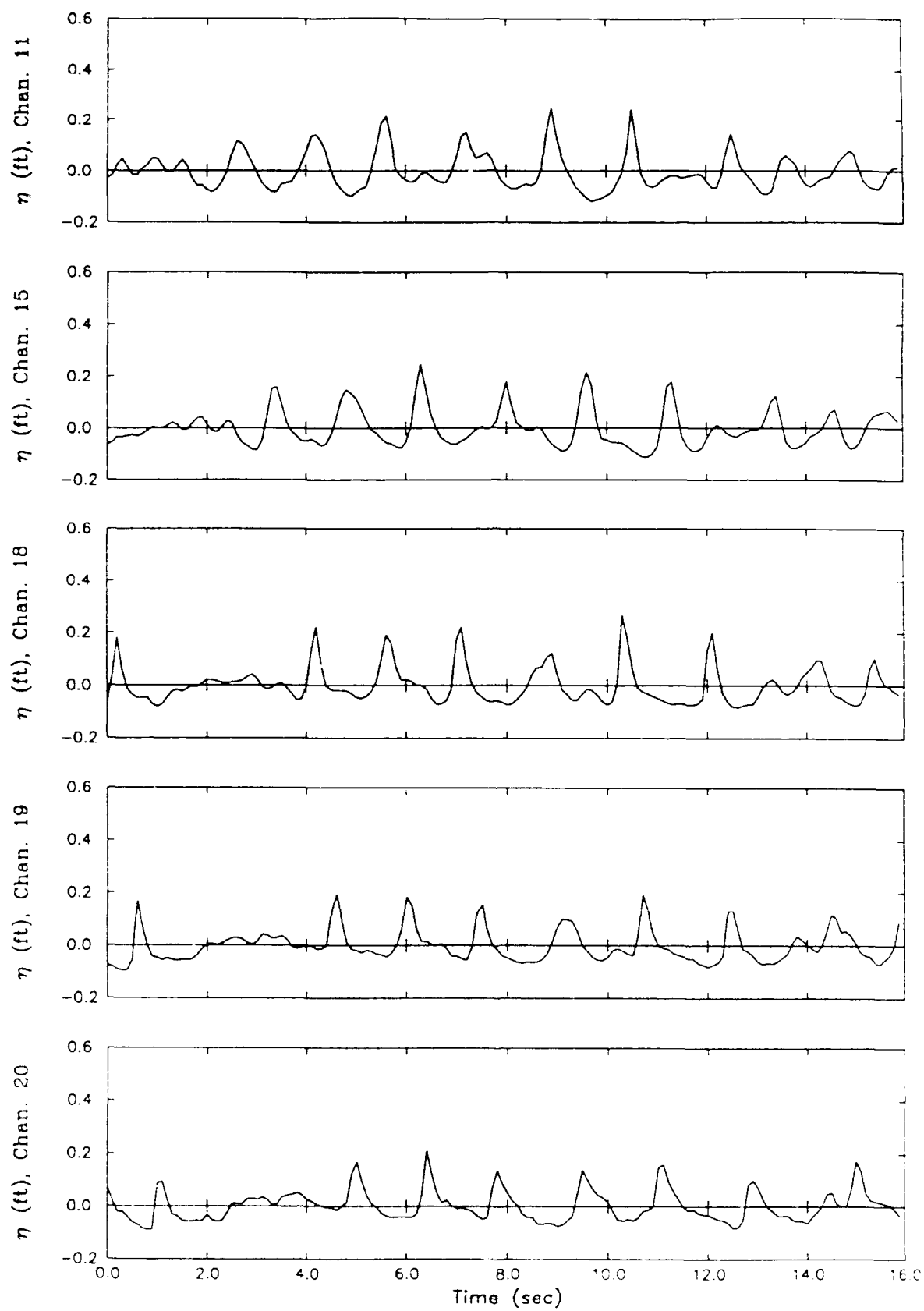
Generalized Beach Model, GBMD0403



Generalized Beach Model, GBMD0403

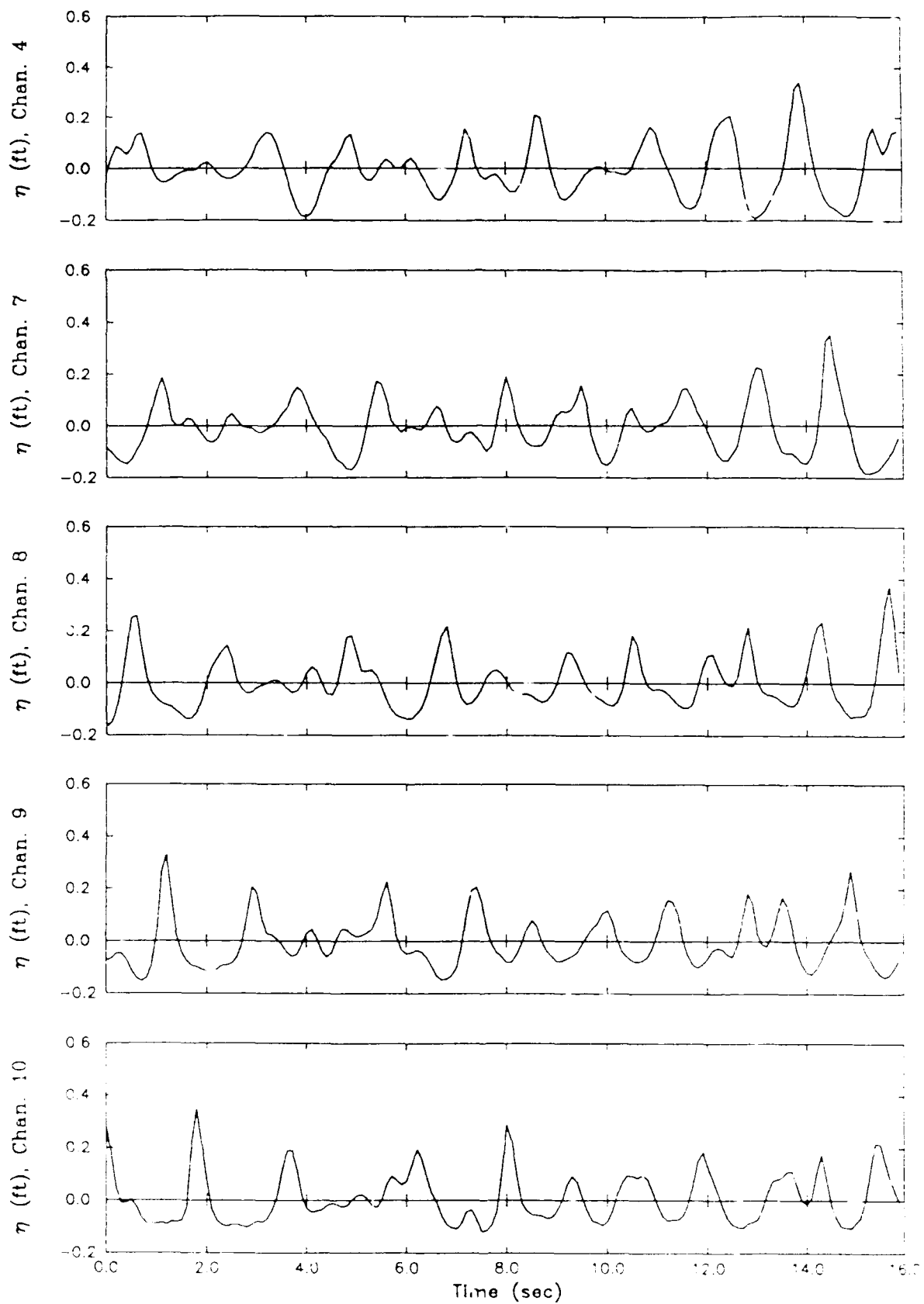


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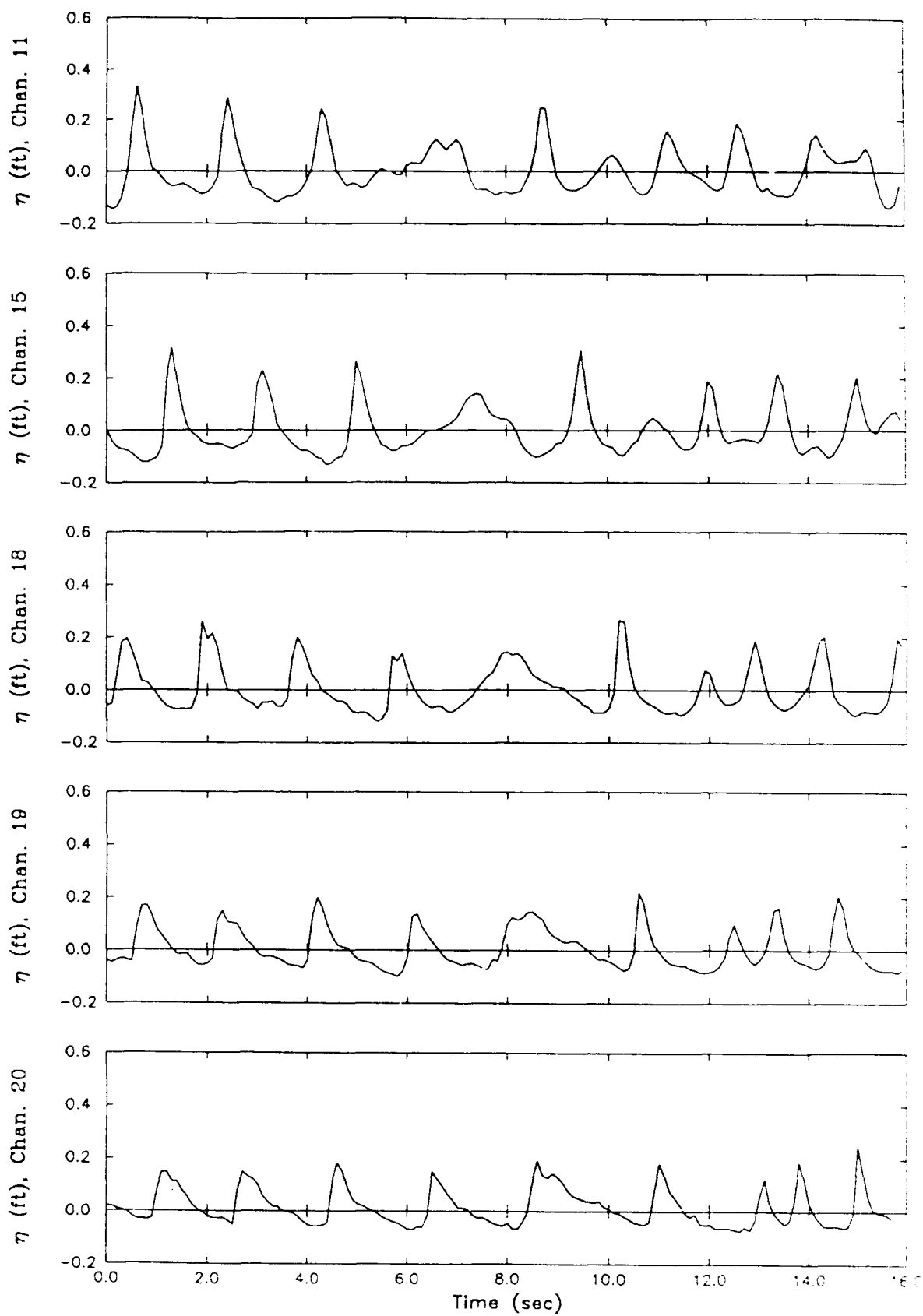


Generalized Beach Model, GBMD0502

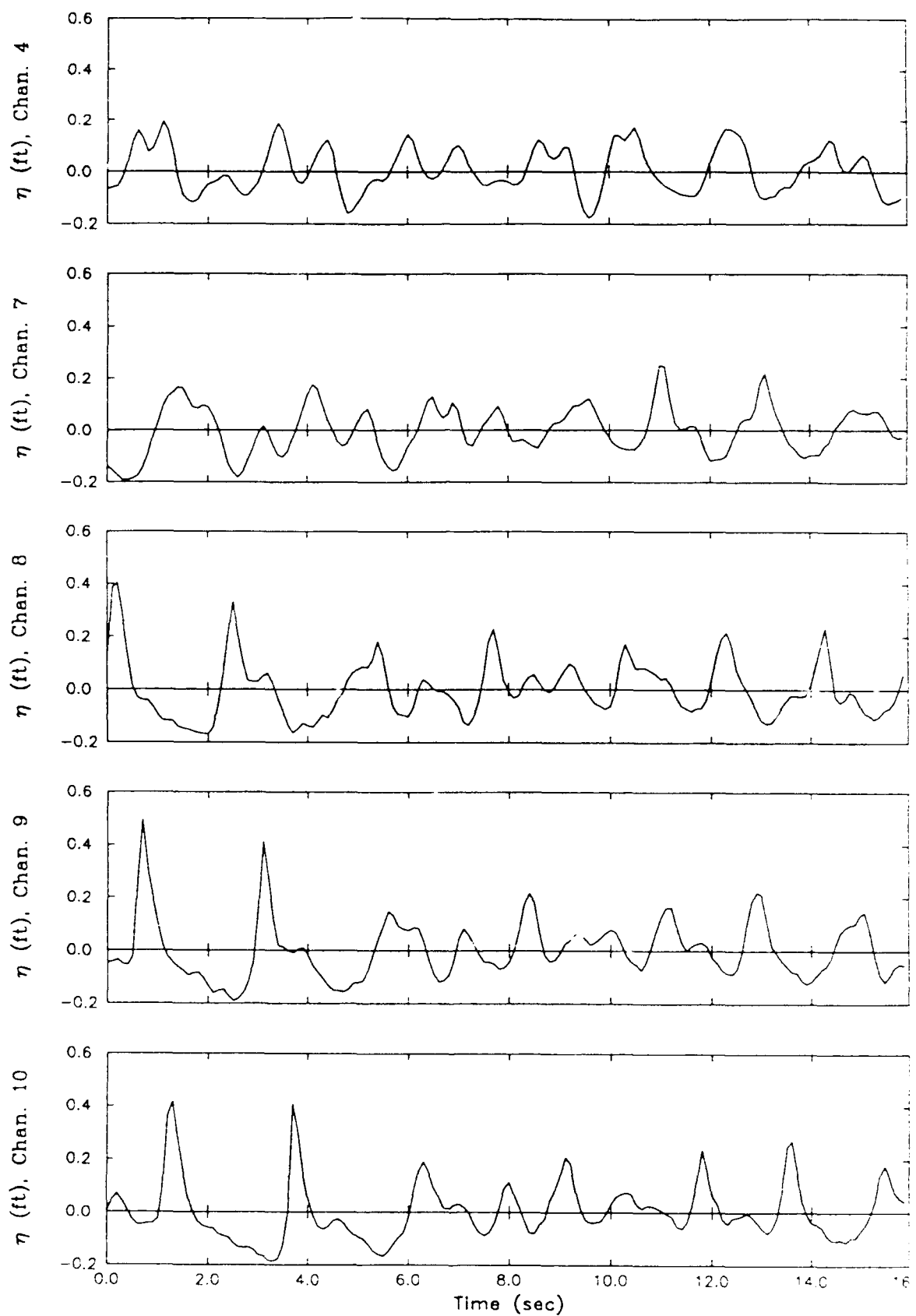




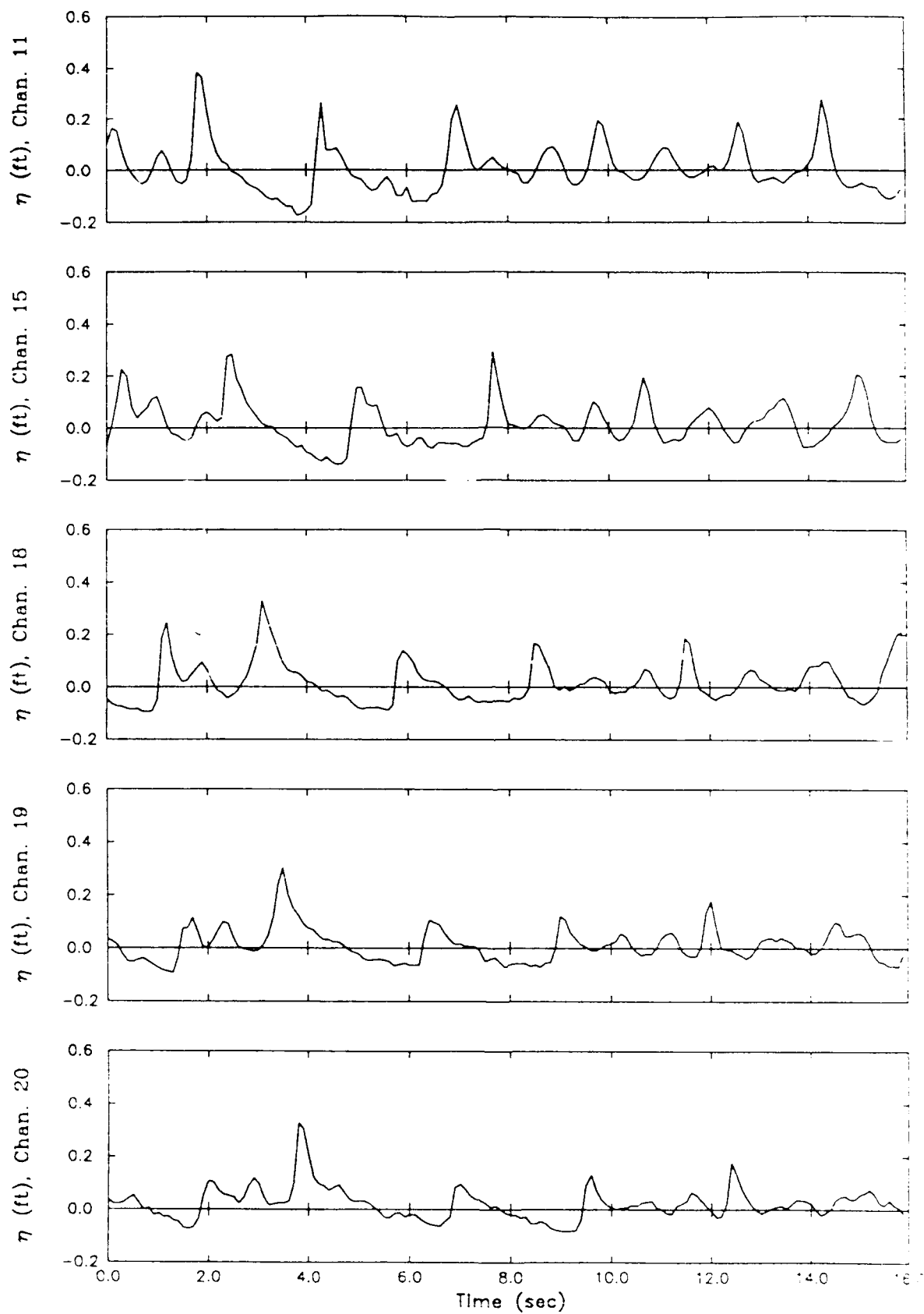
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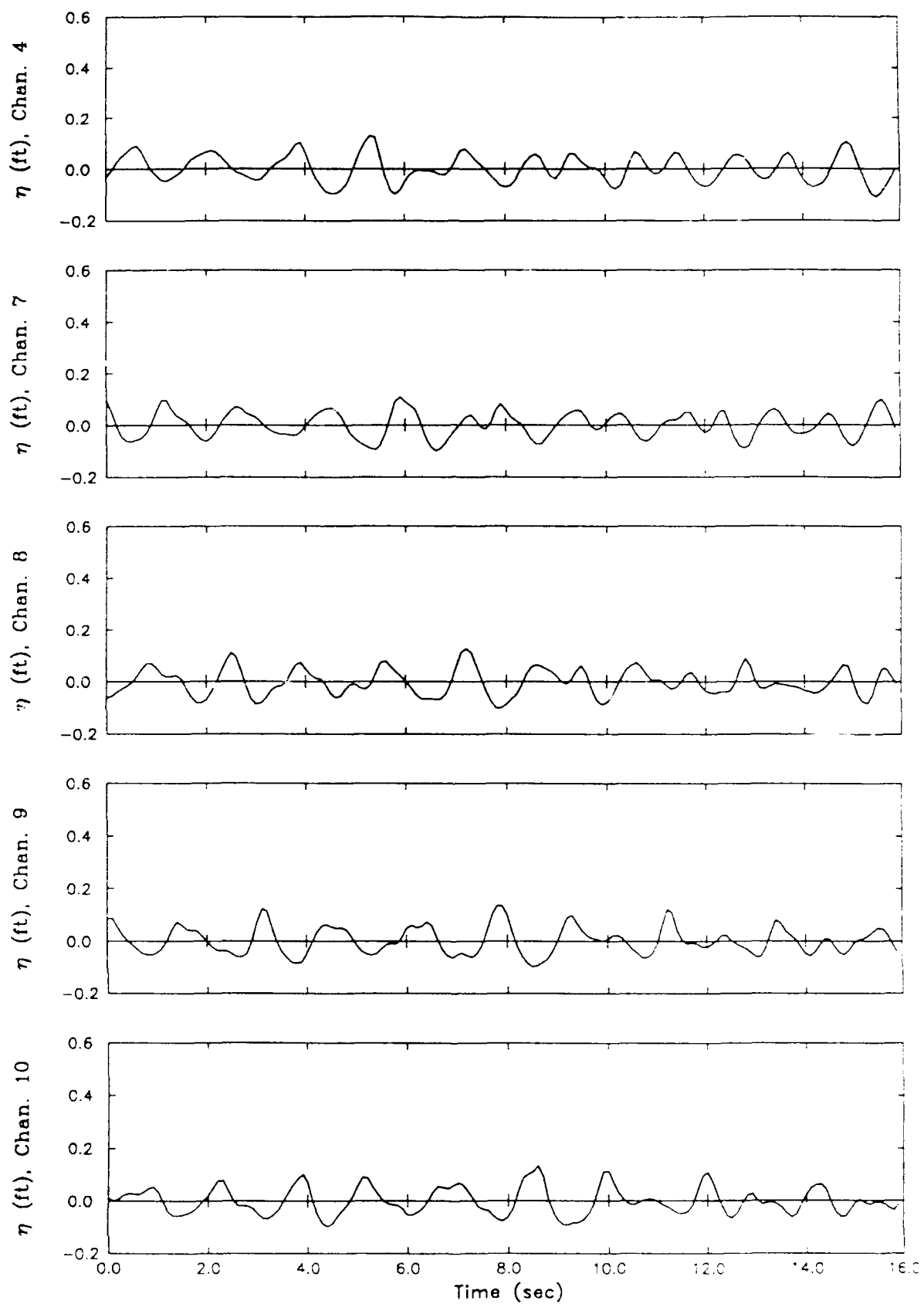
Generalized Beach Model, GBMD0602



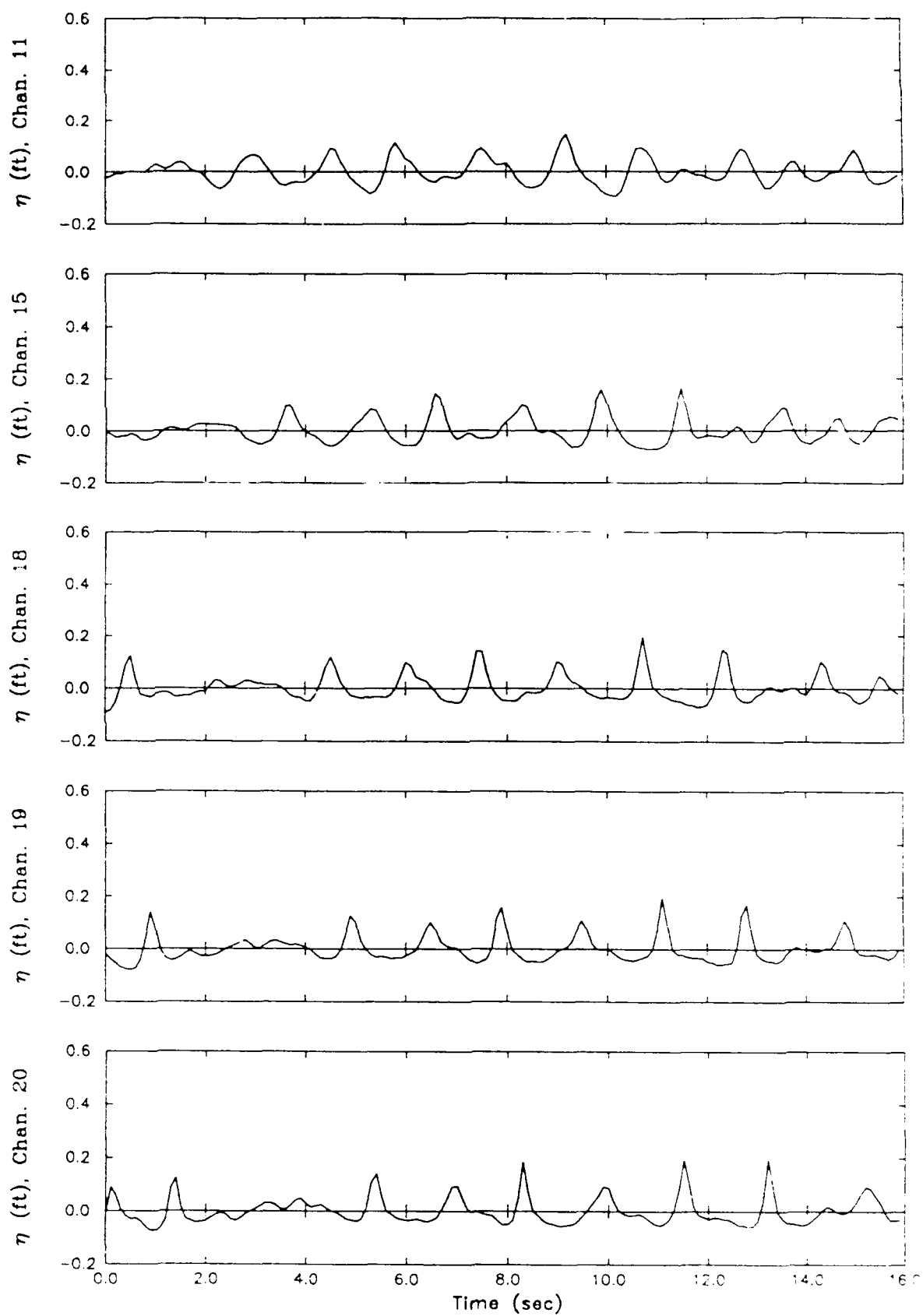
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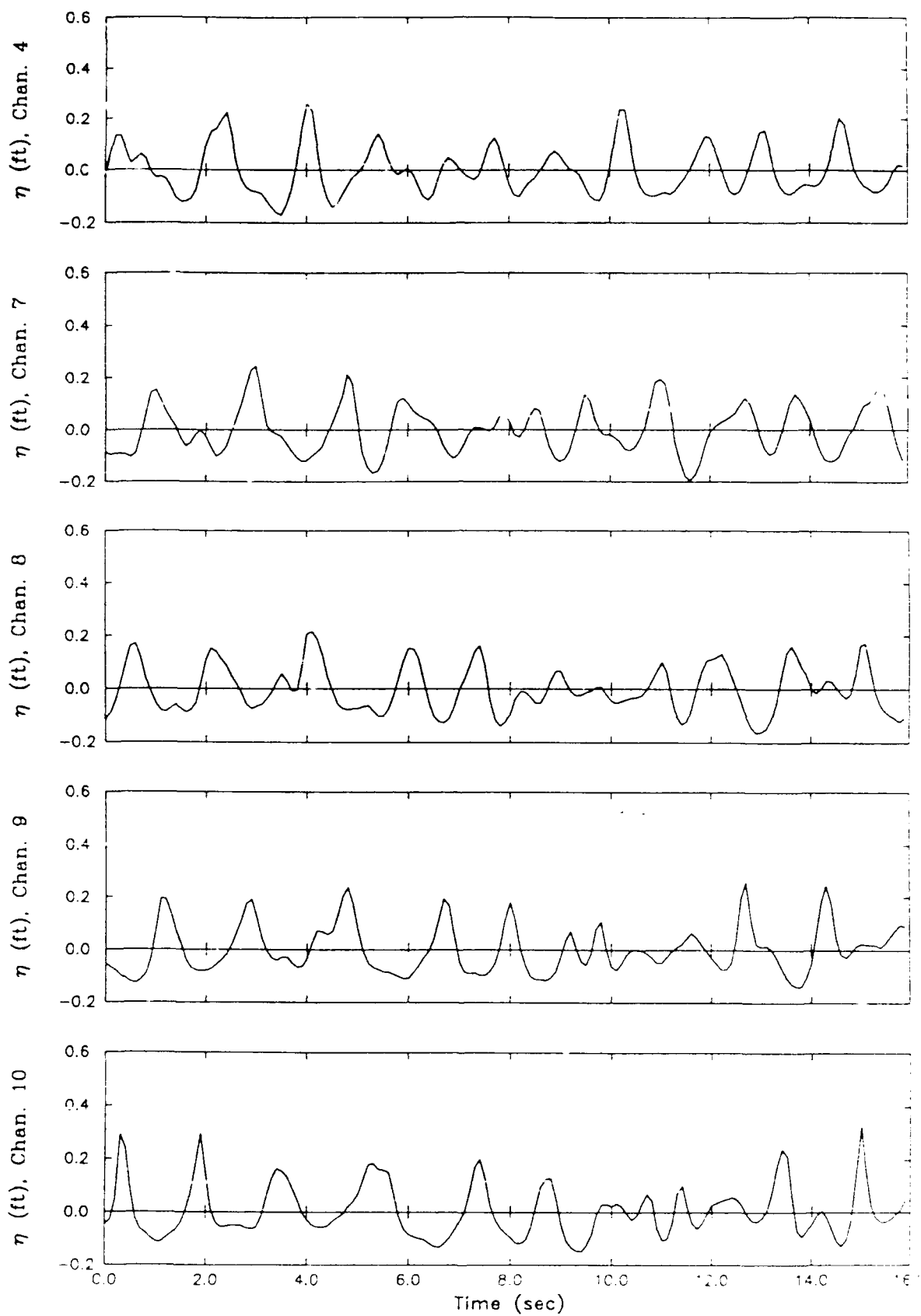
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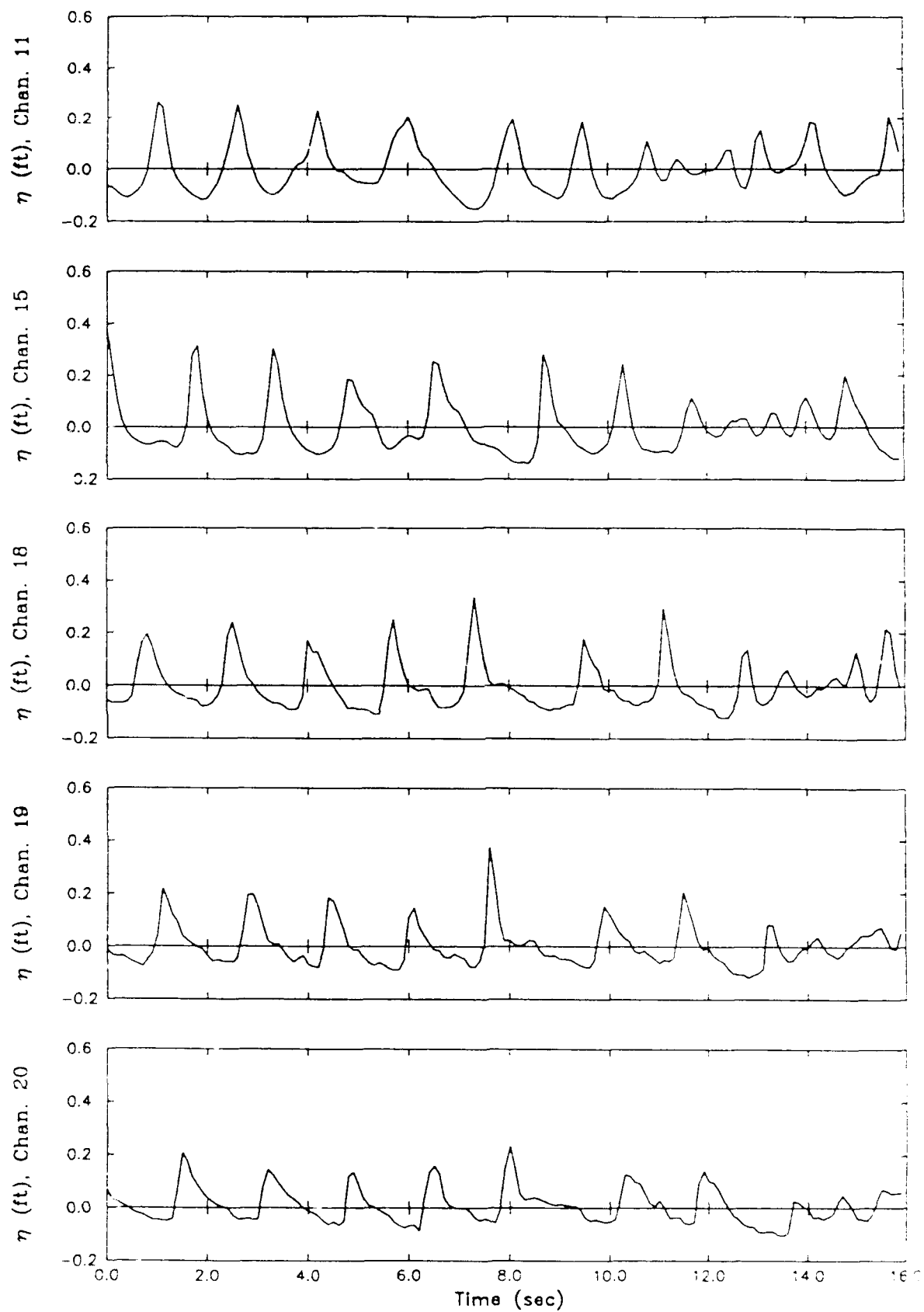
Generalized Beach Model, GBMD0802



Generalized Beach Model, GBMD0802

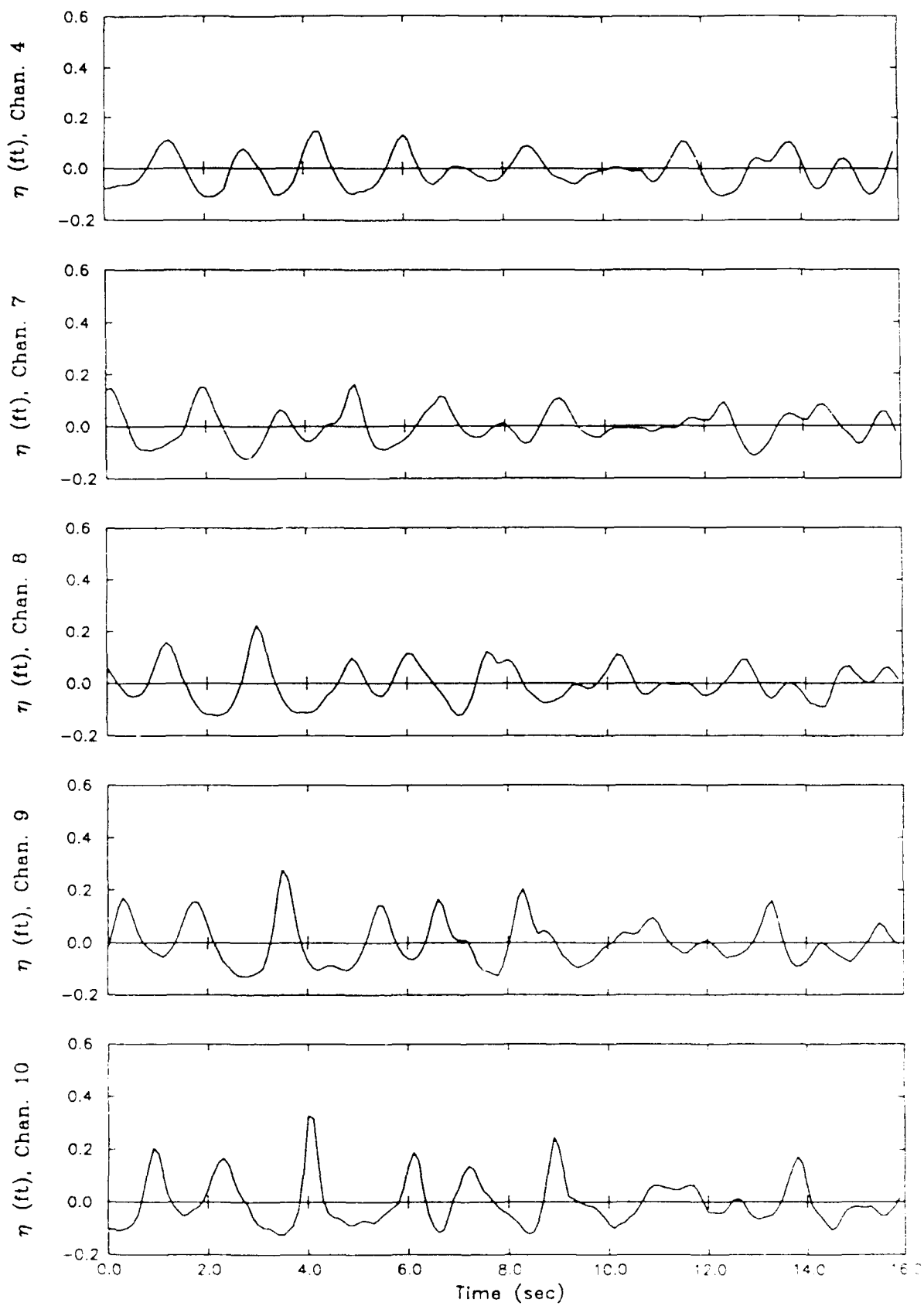


Generalized Beach Model, GBMD0902

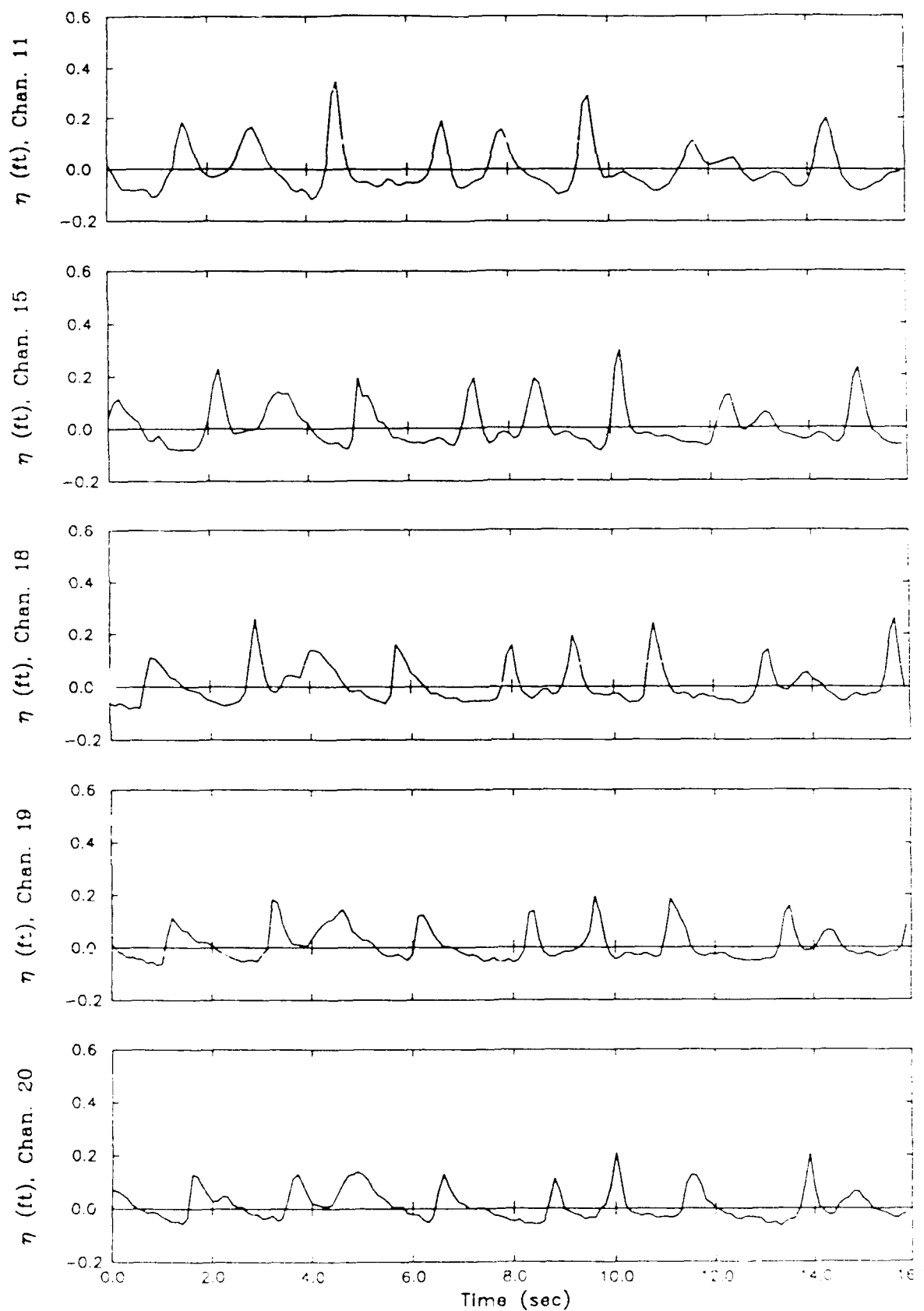


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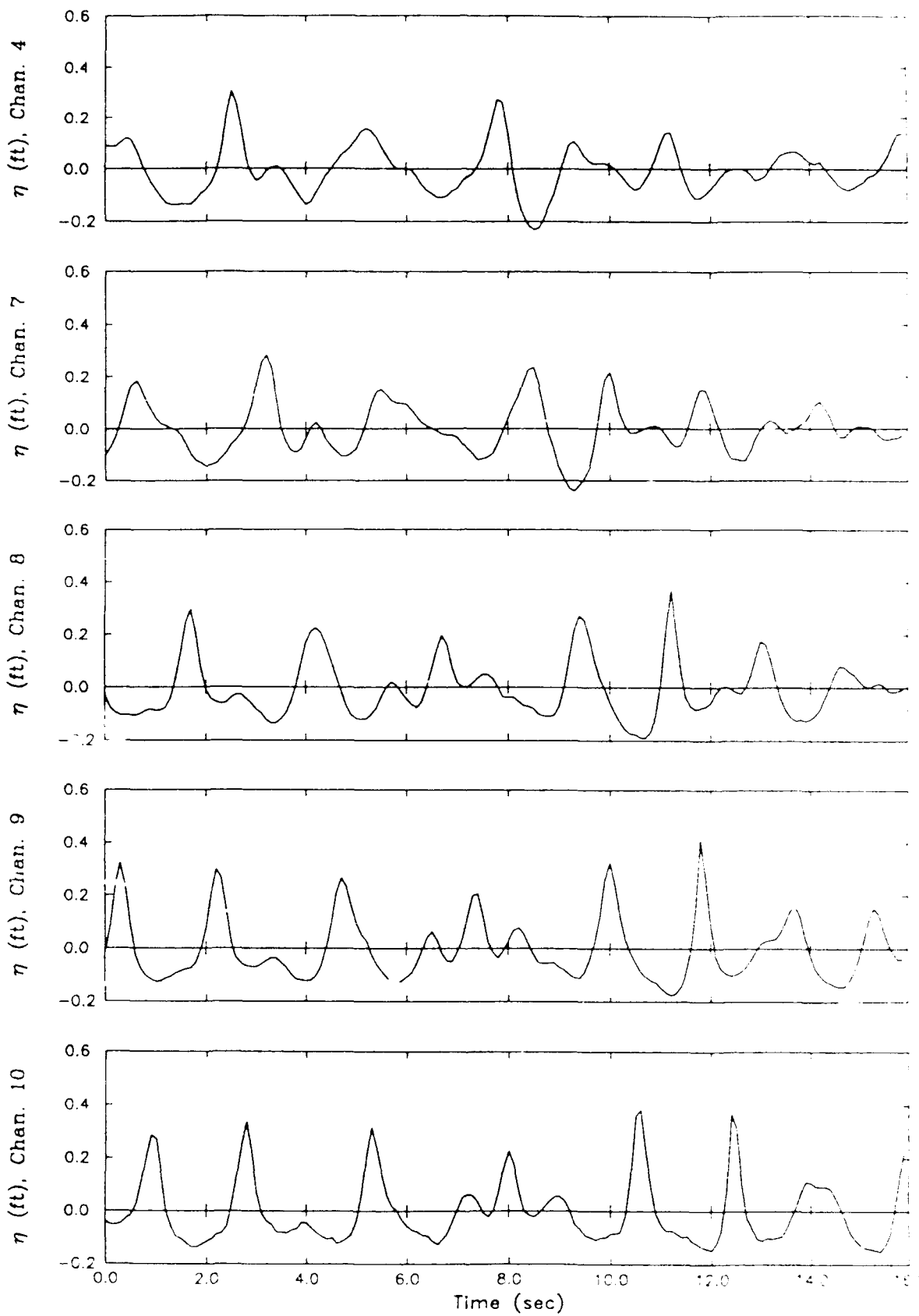




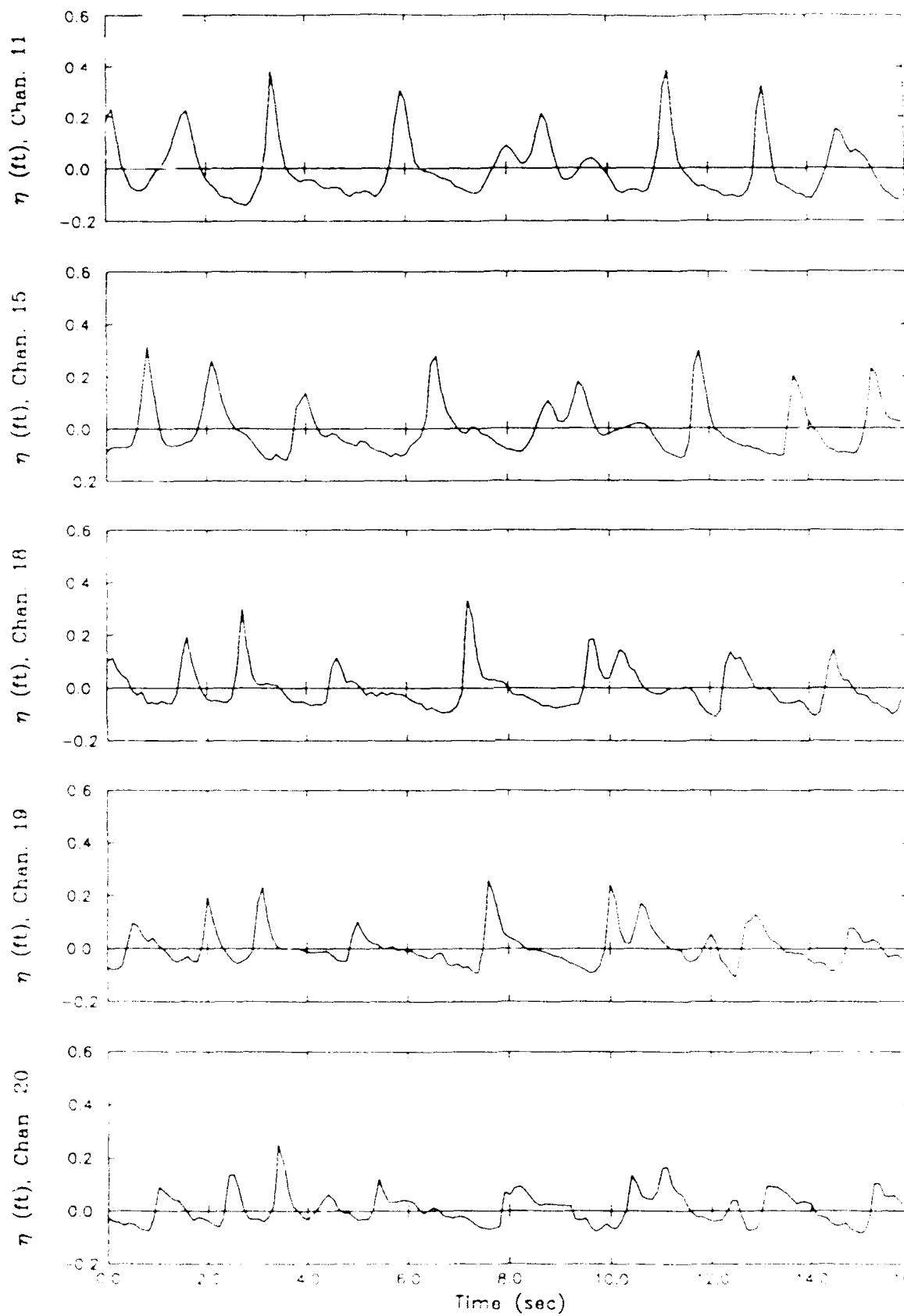
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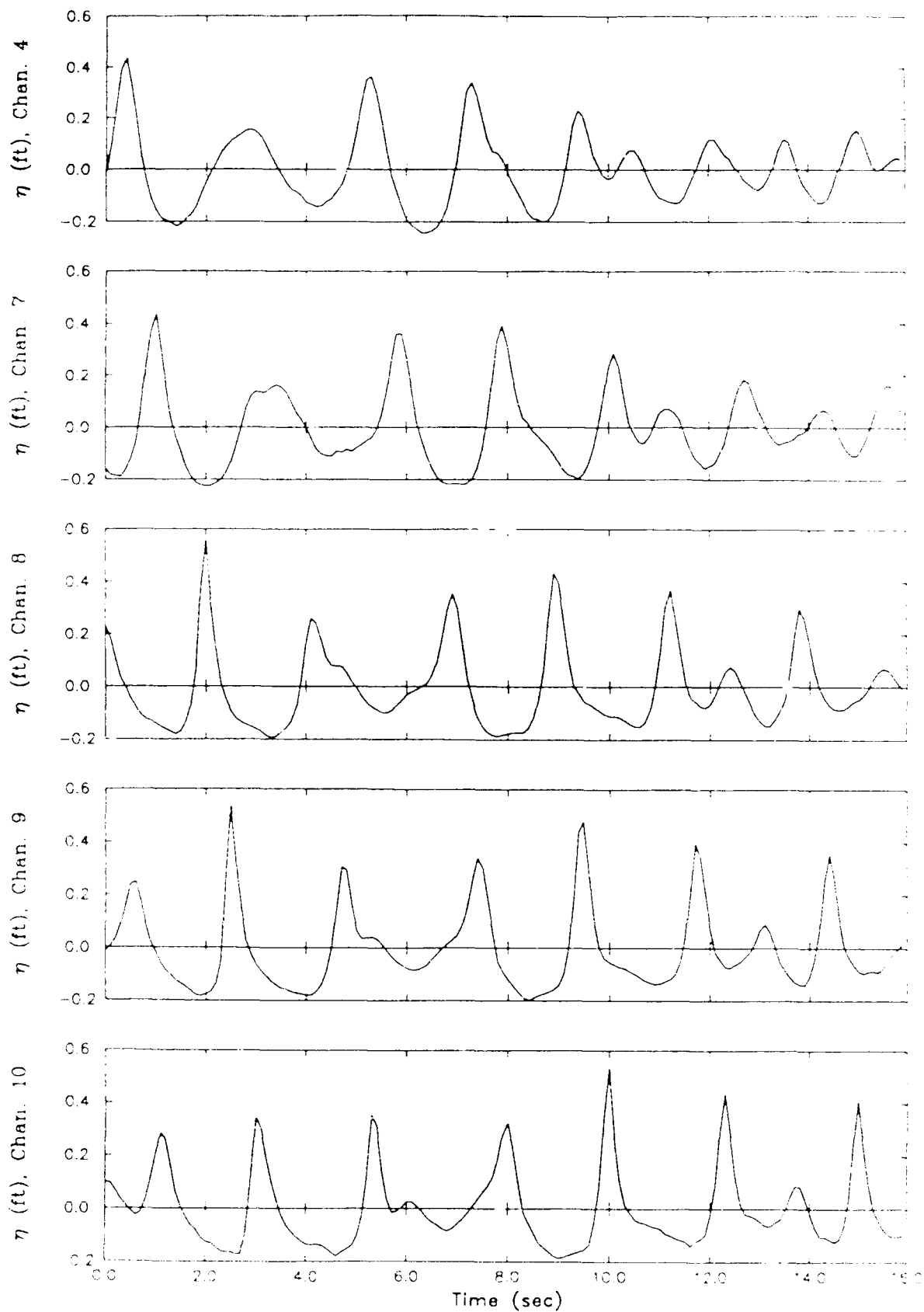
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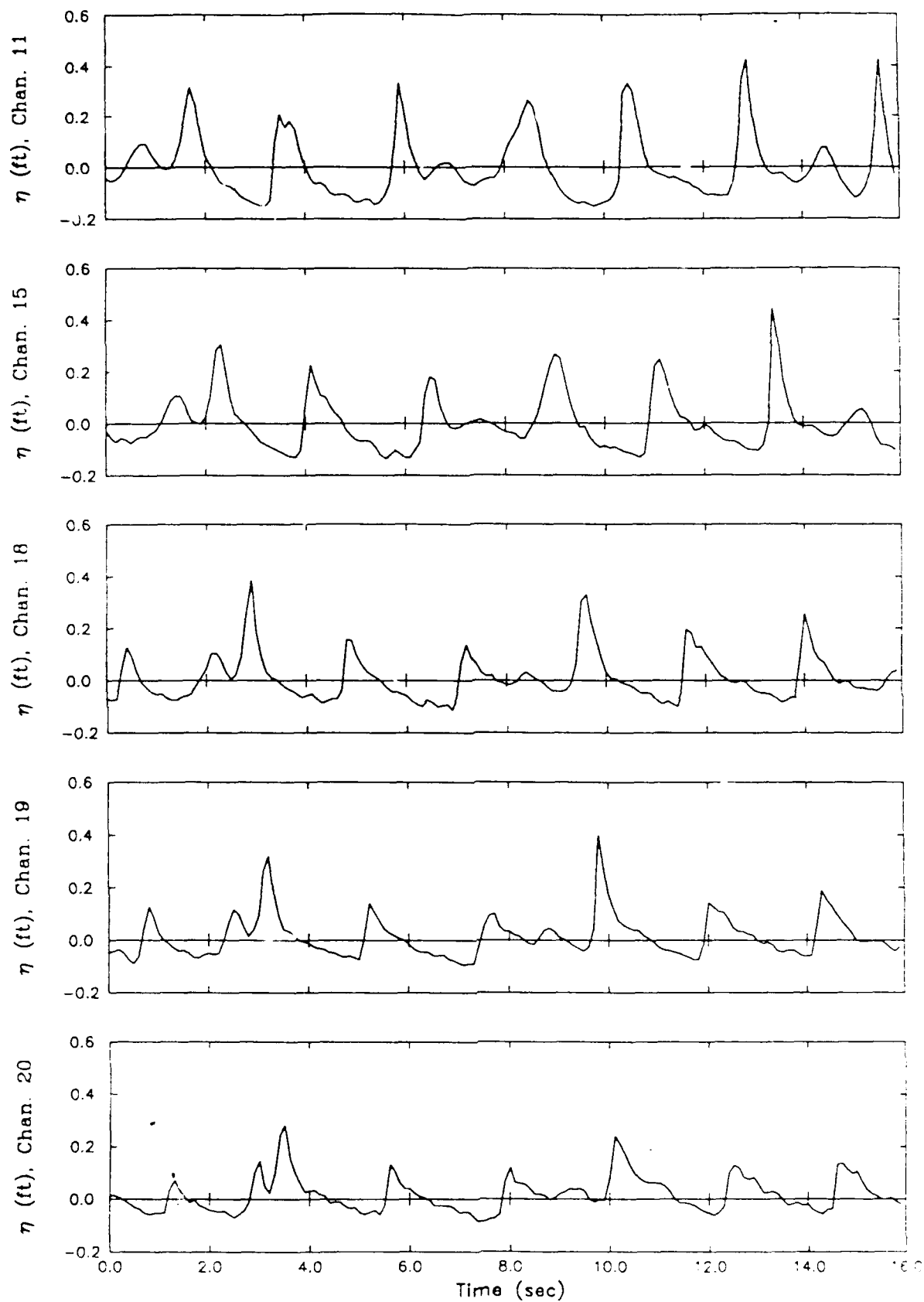
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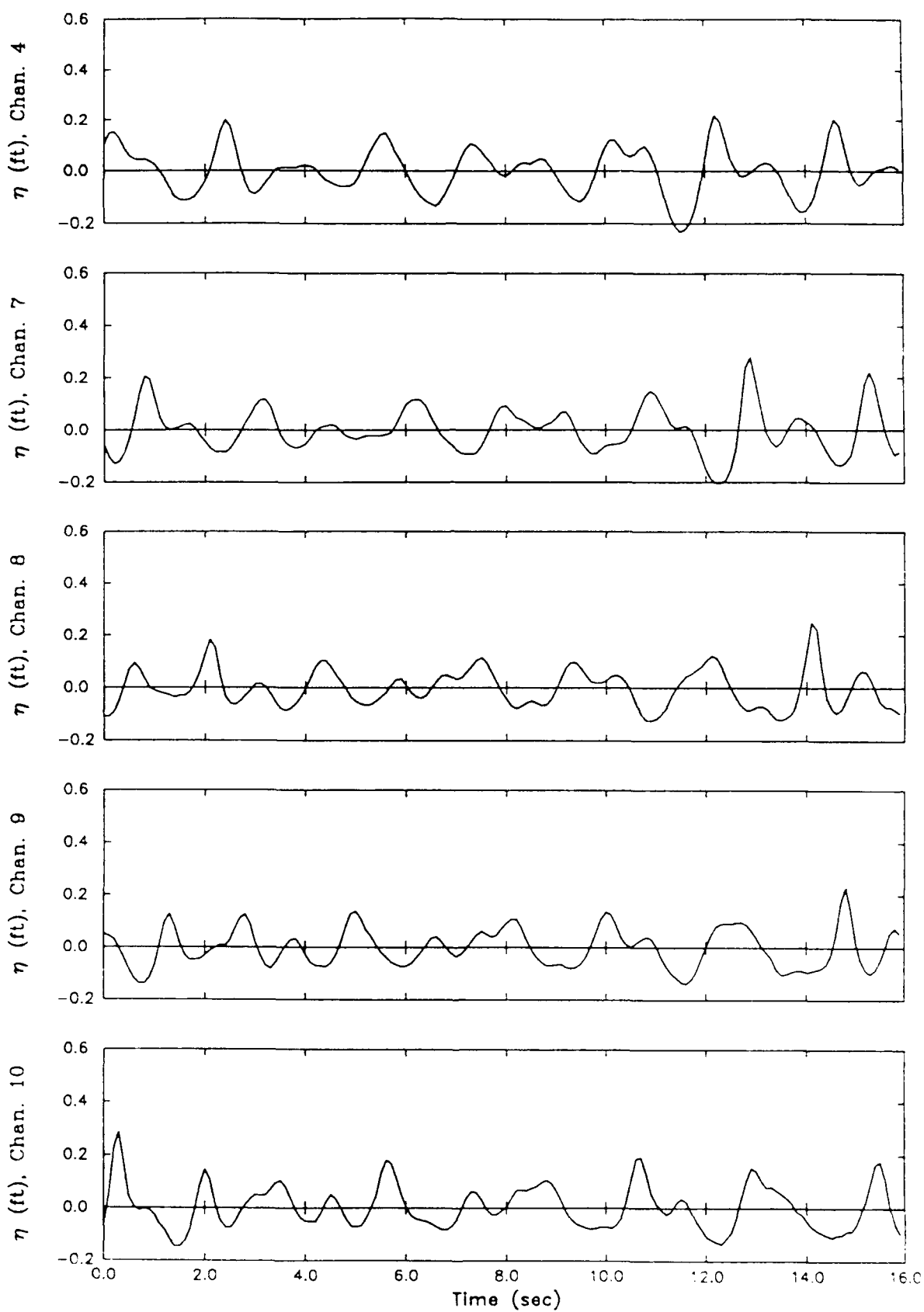
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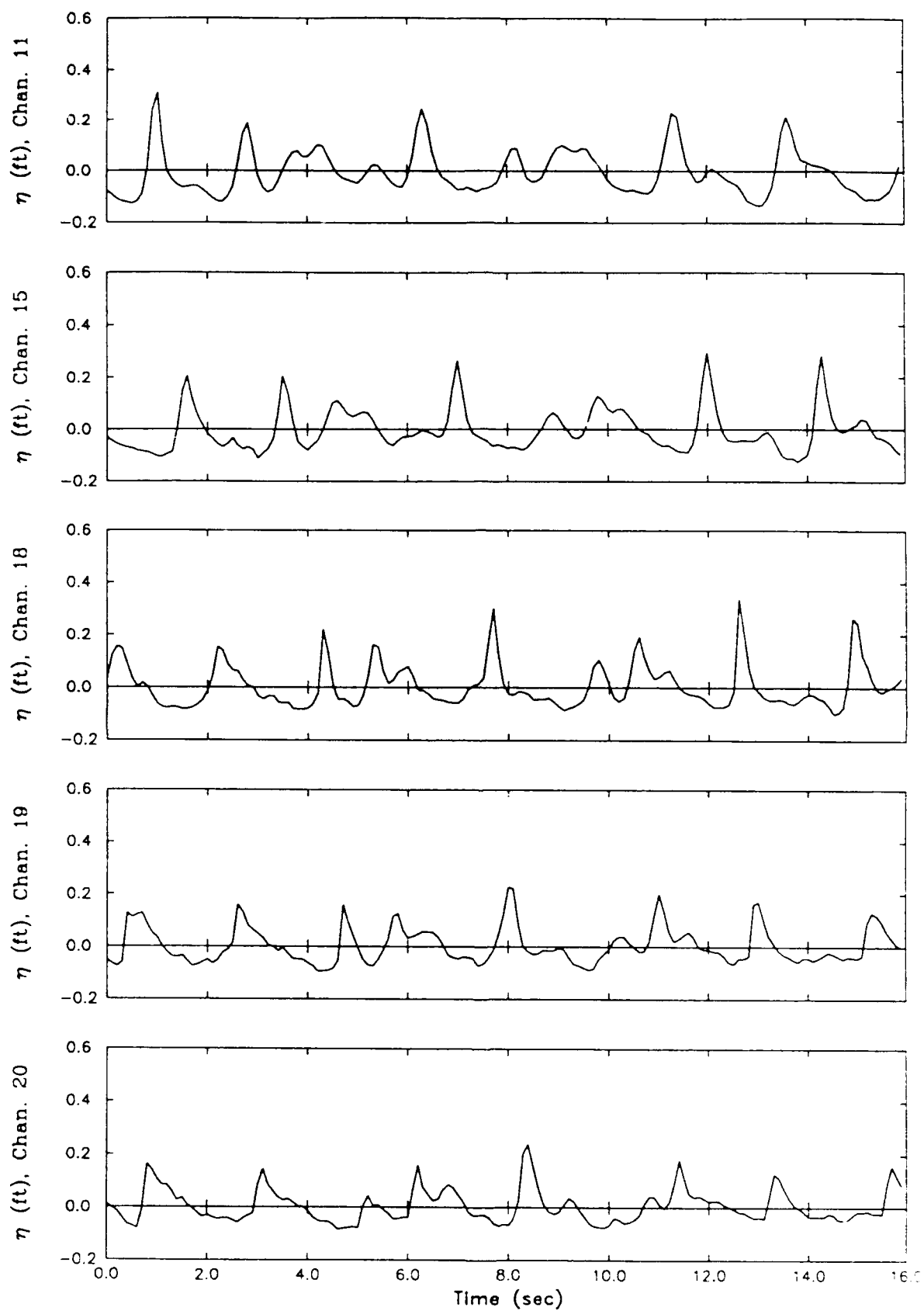
Generalized Beach Model, GBMD1903



Generalized Beach Model, GBMD1903

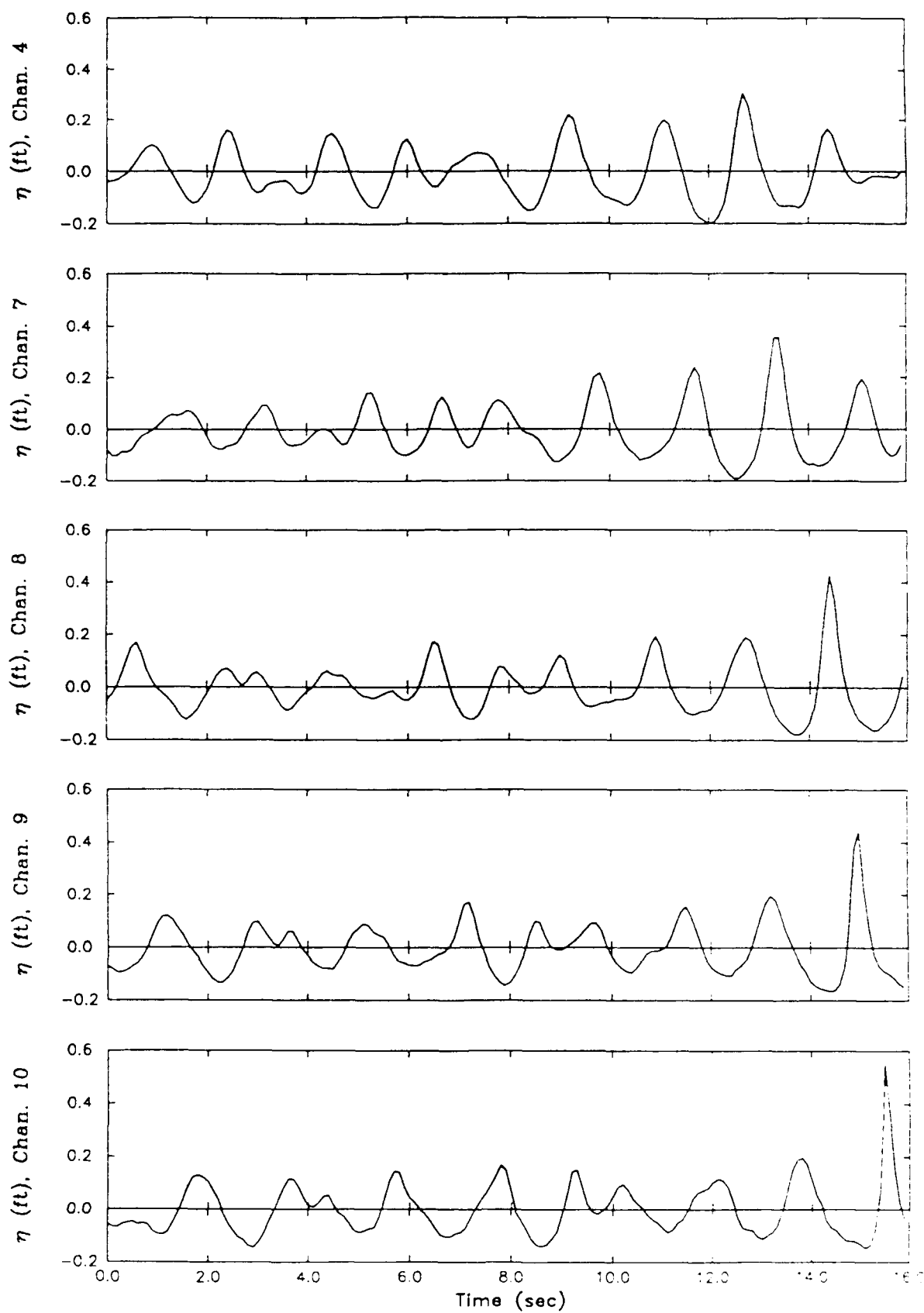


Generalized Beach Model, GBMD2303

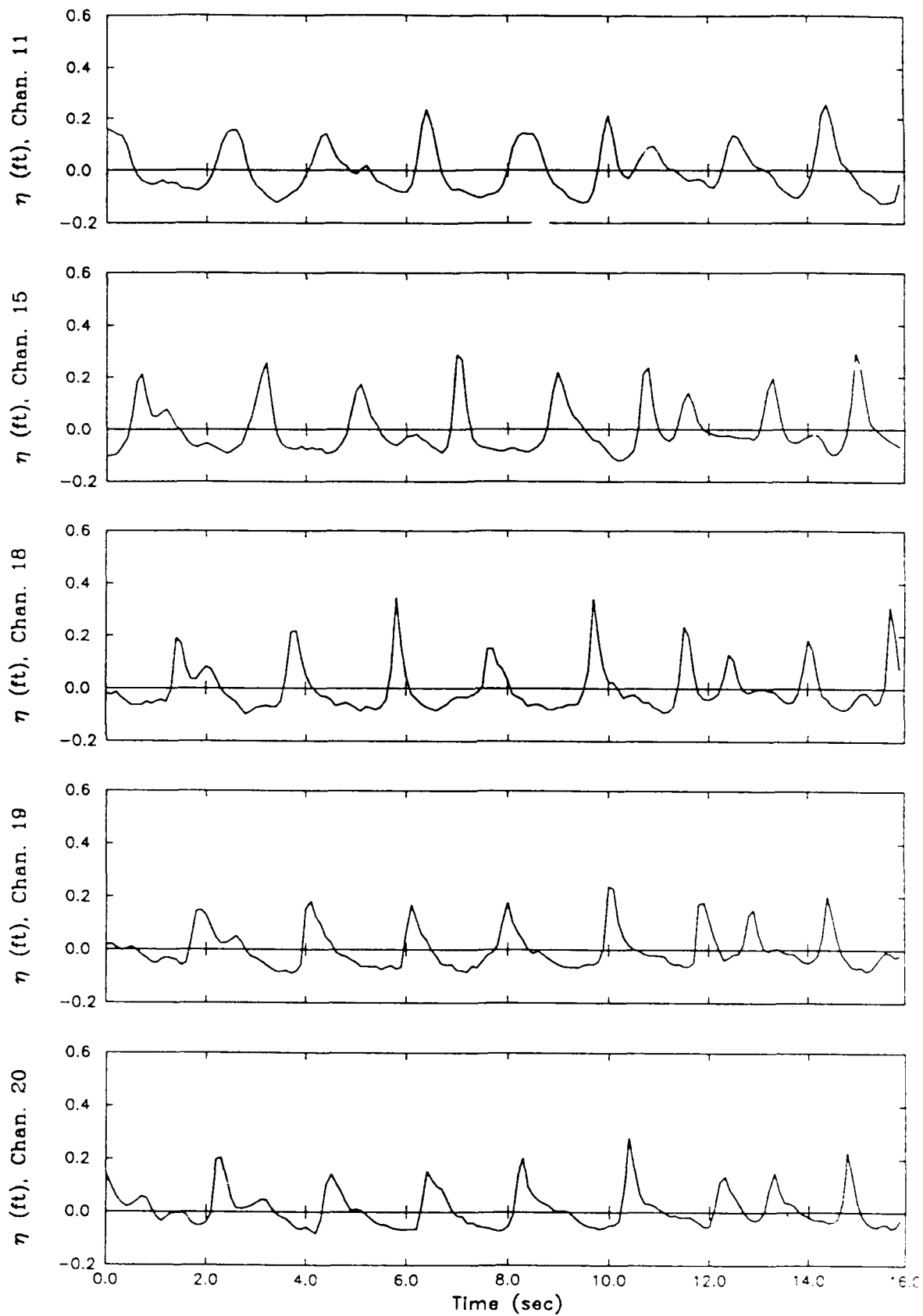


Generalized Beach Model, GBMD2303

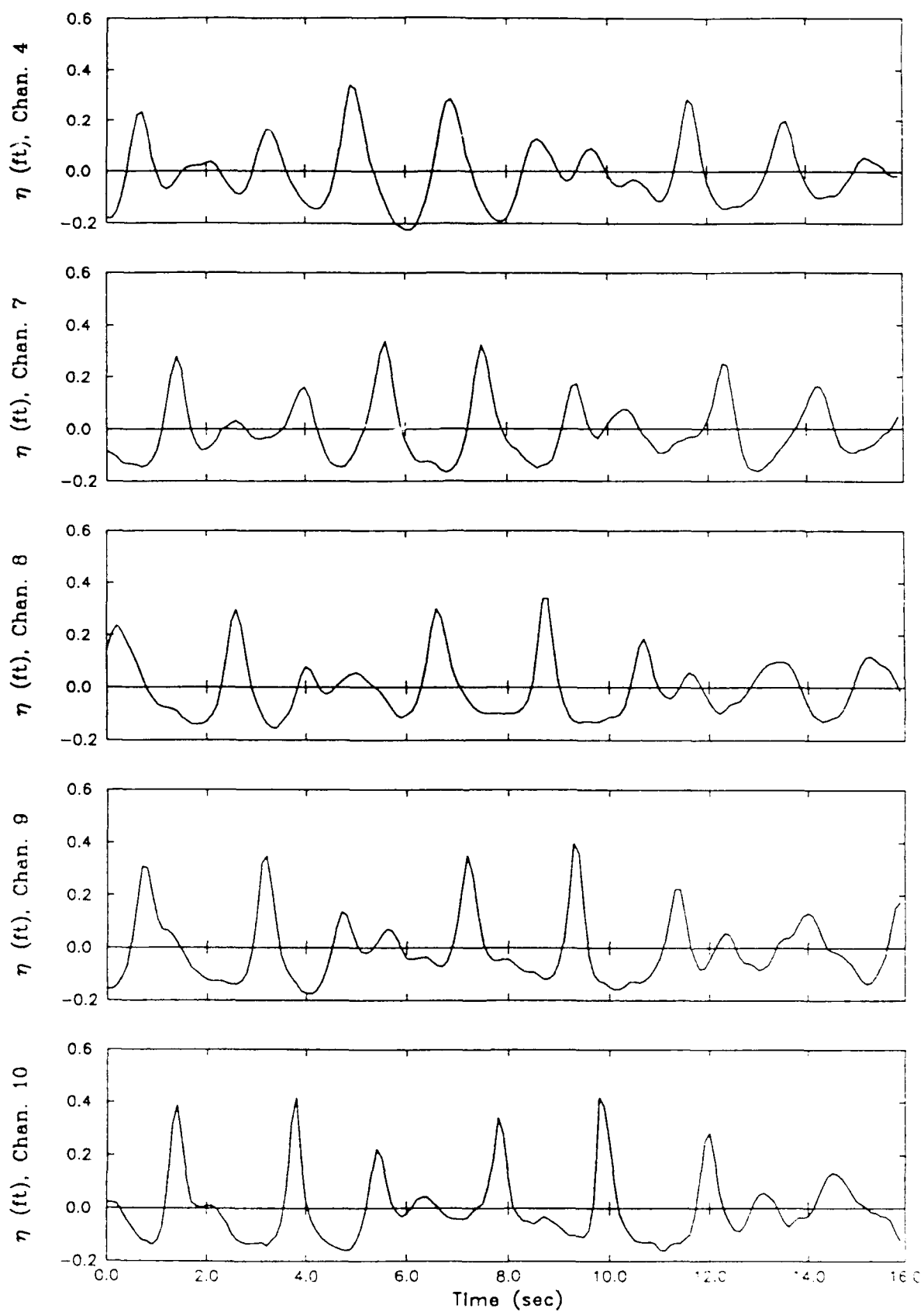




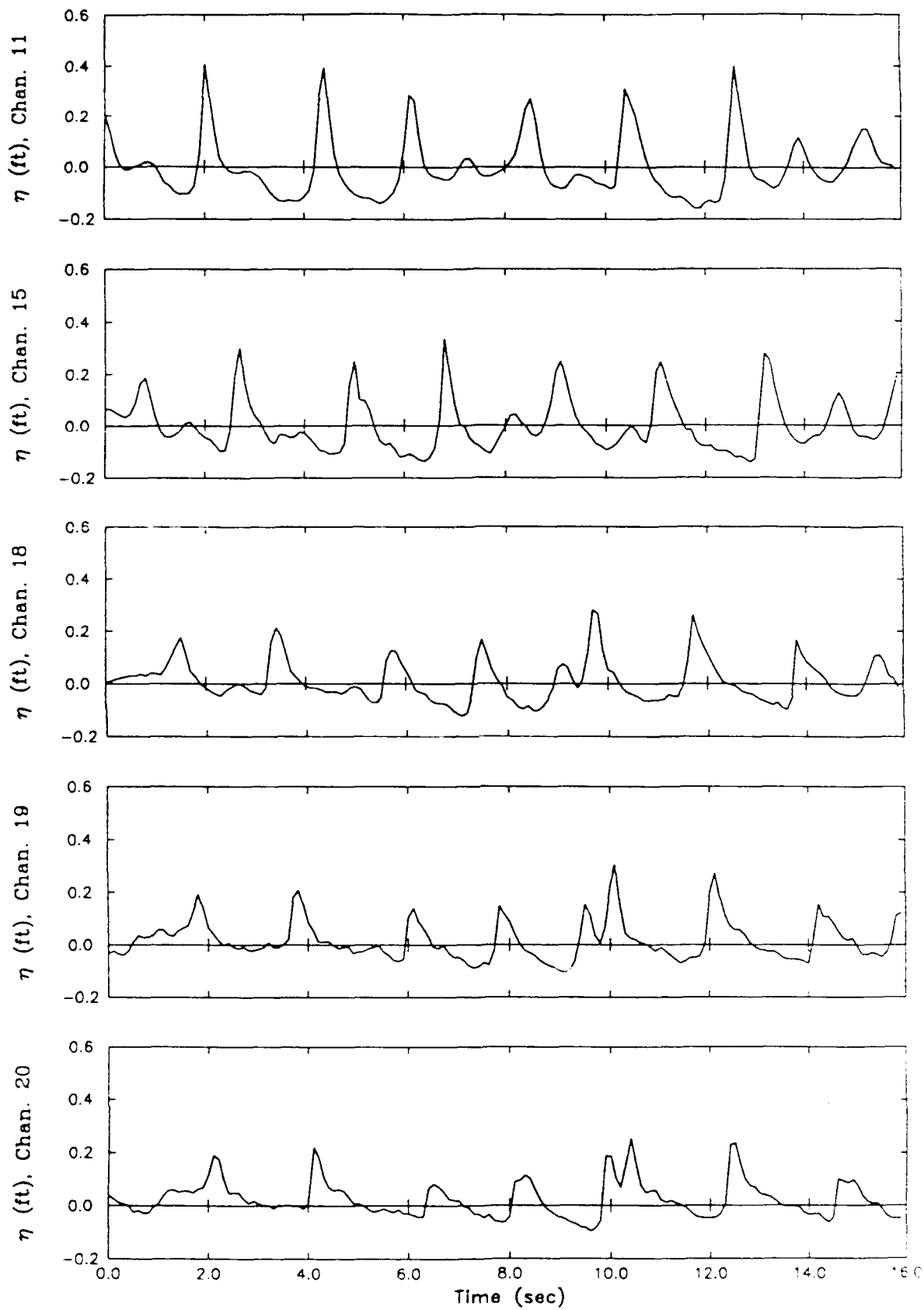
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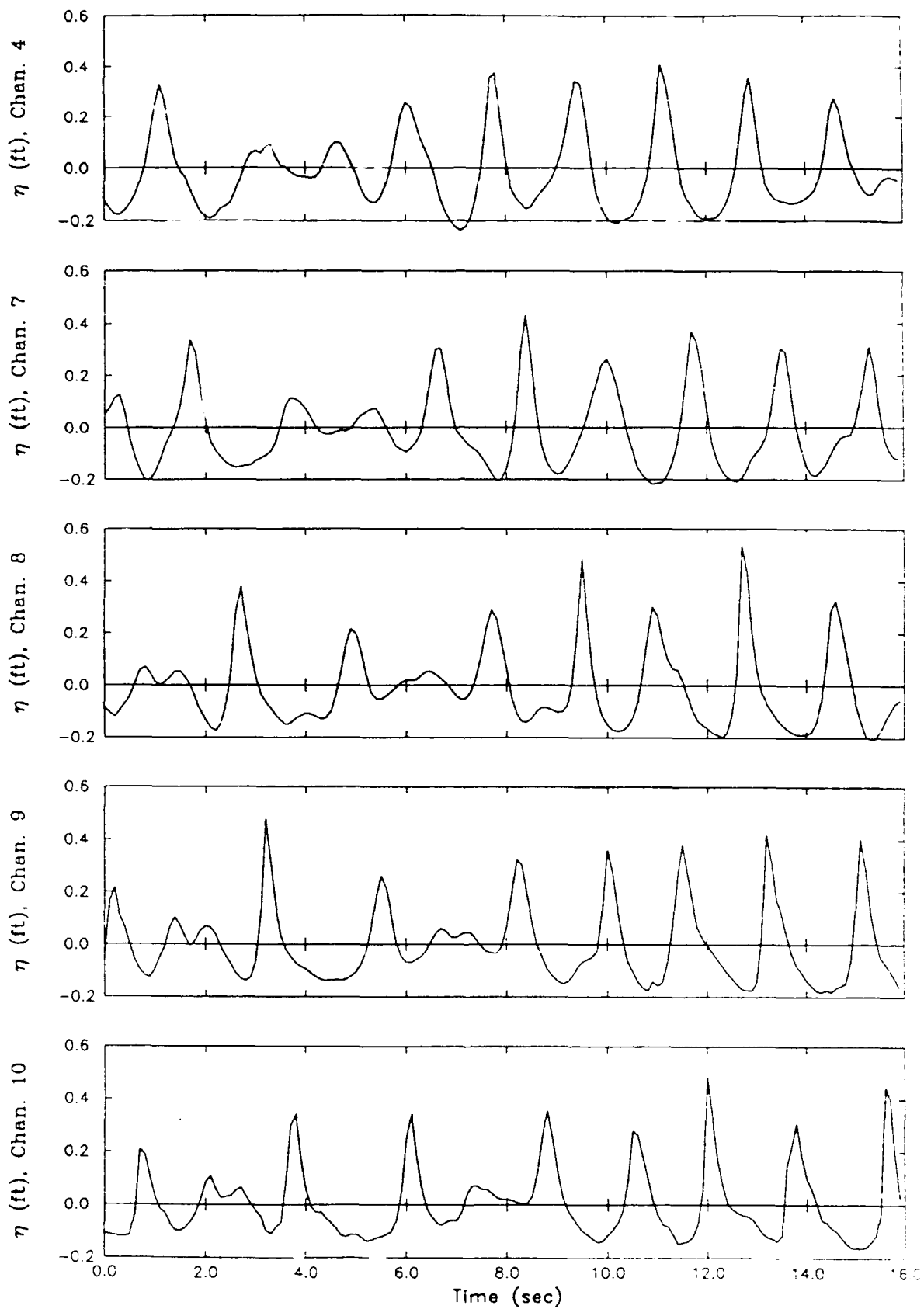
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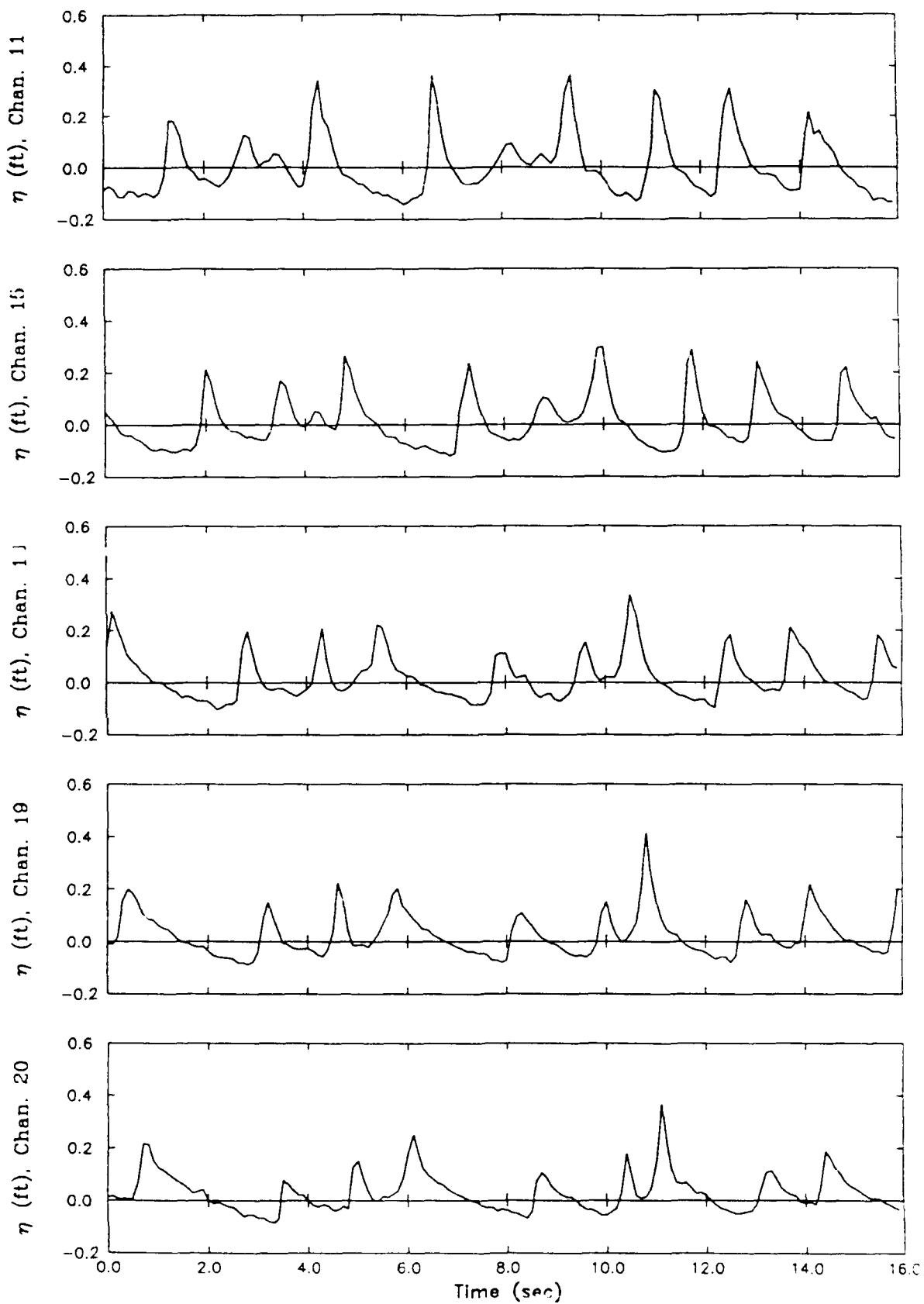
Generalized Beach Model, GBMD2903



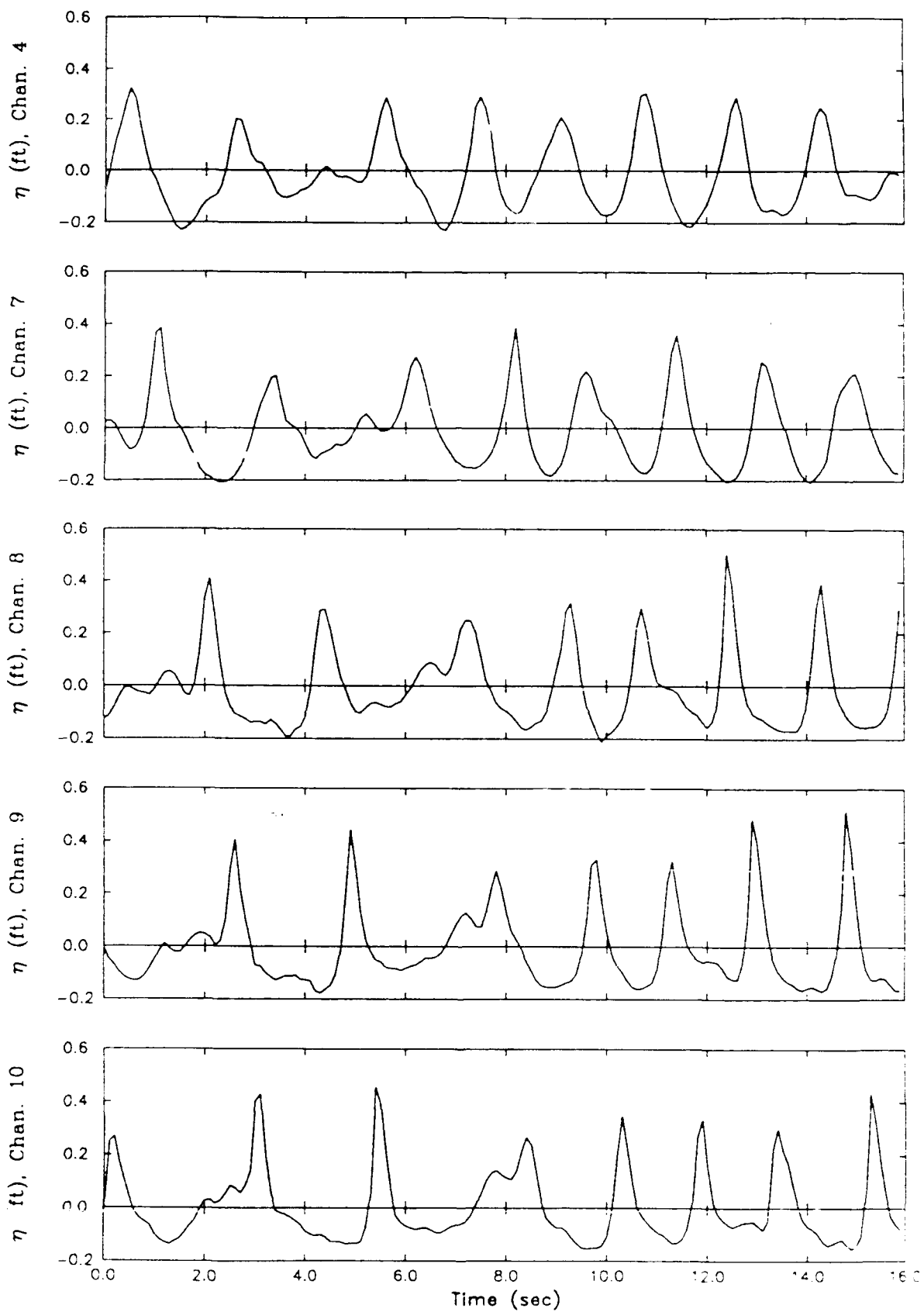
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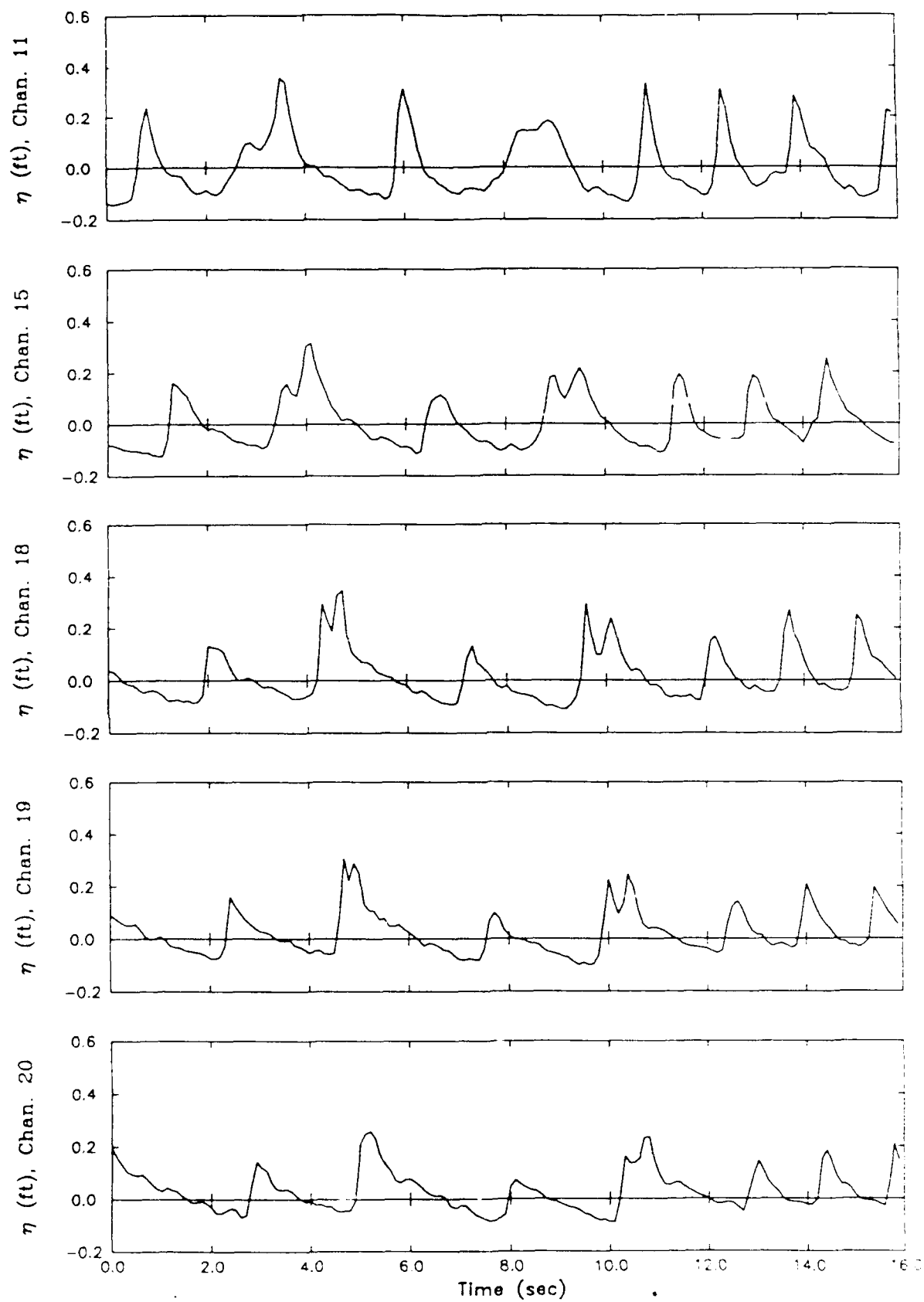
Generalized Beach Model, GBMD3302



Generalized Beach Model, GBMD3302

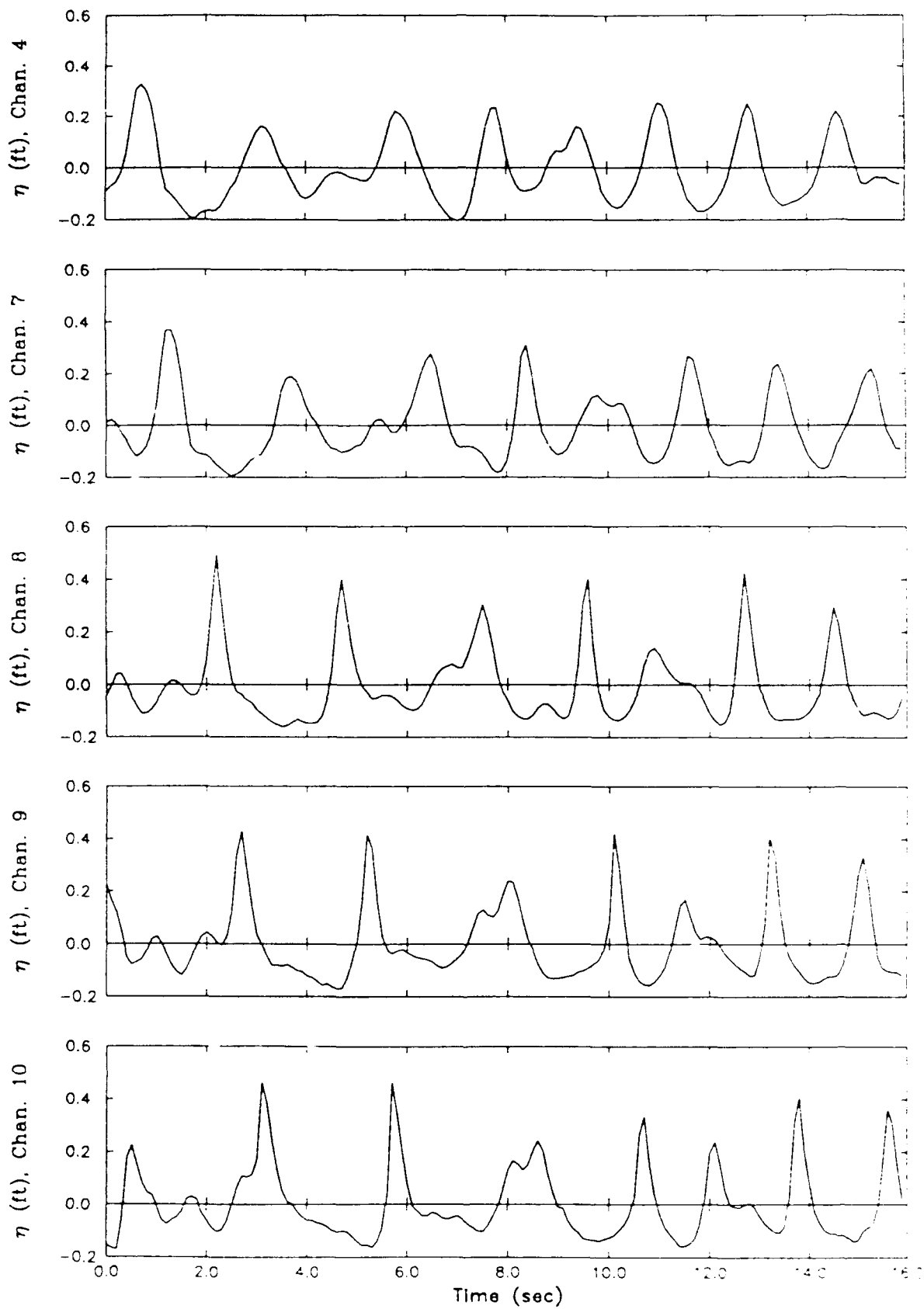


Generalized Beach Model, GBMD3602

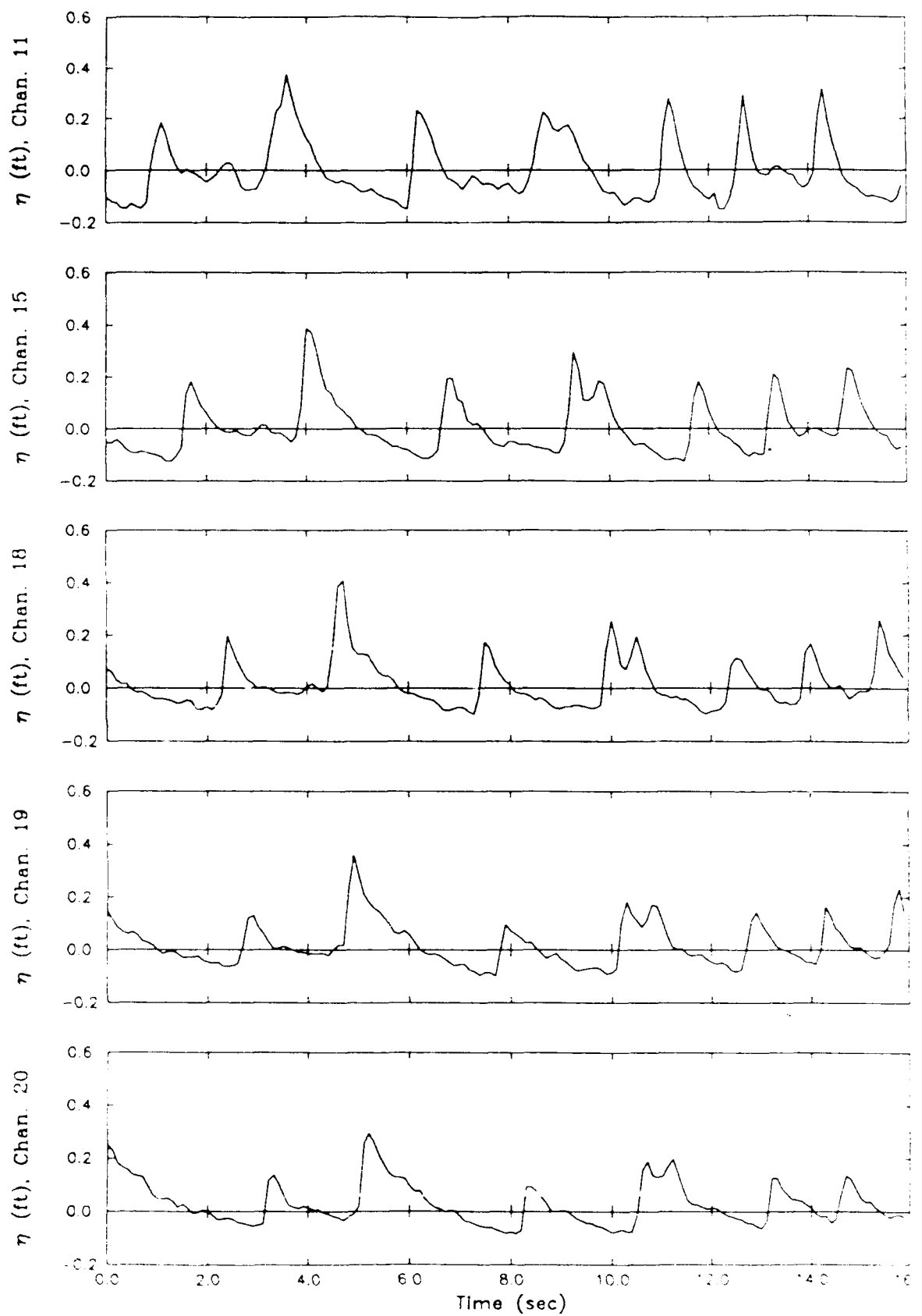


Generalized Beach Model, GBMD3602

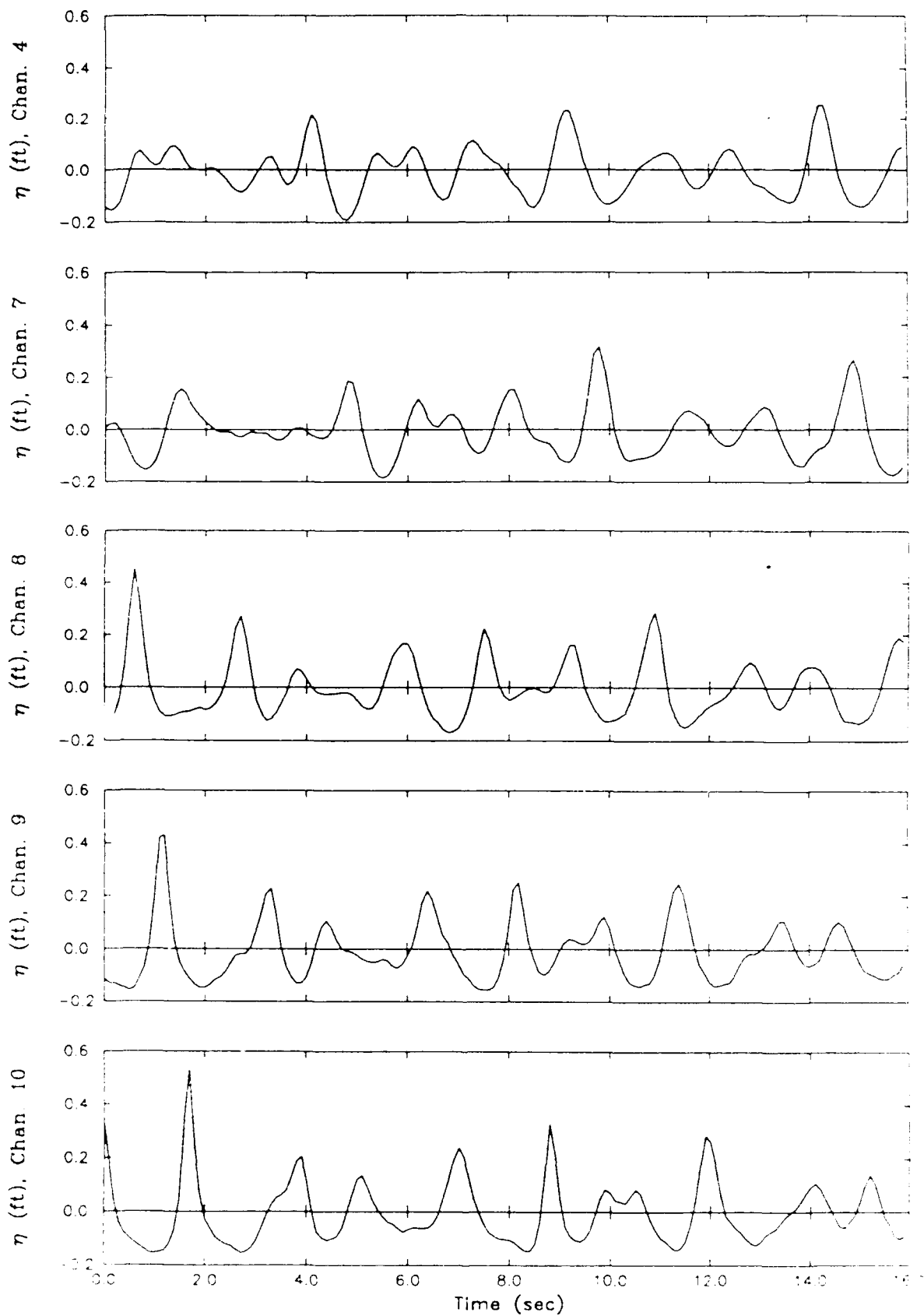




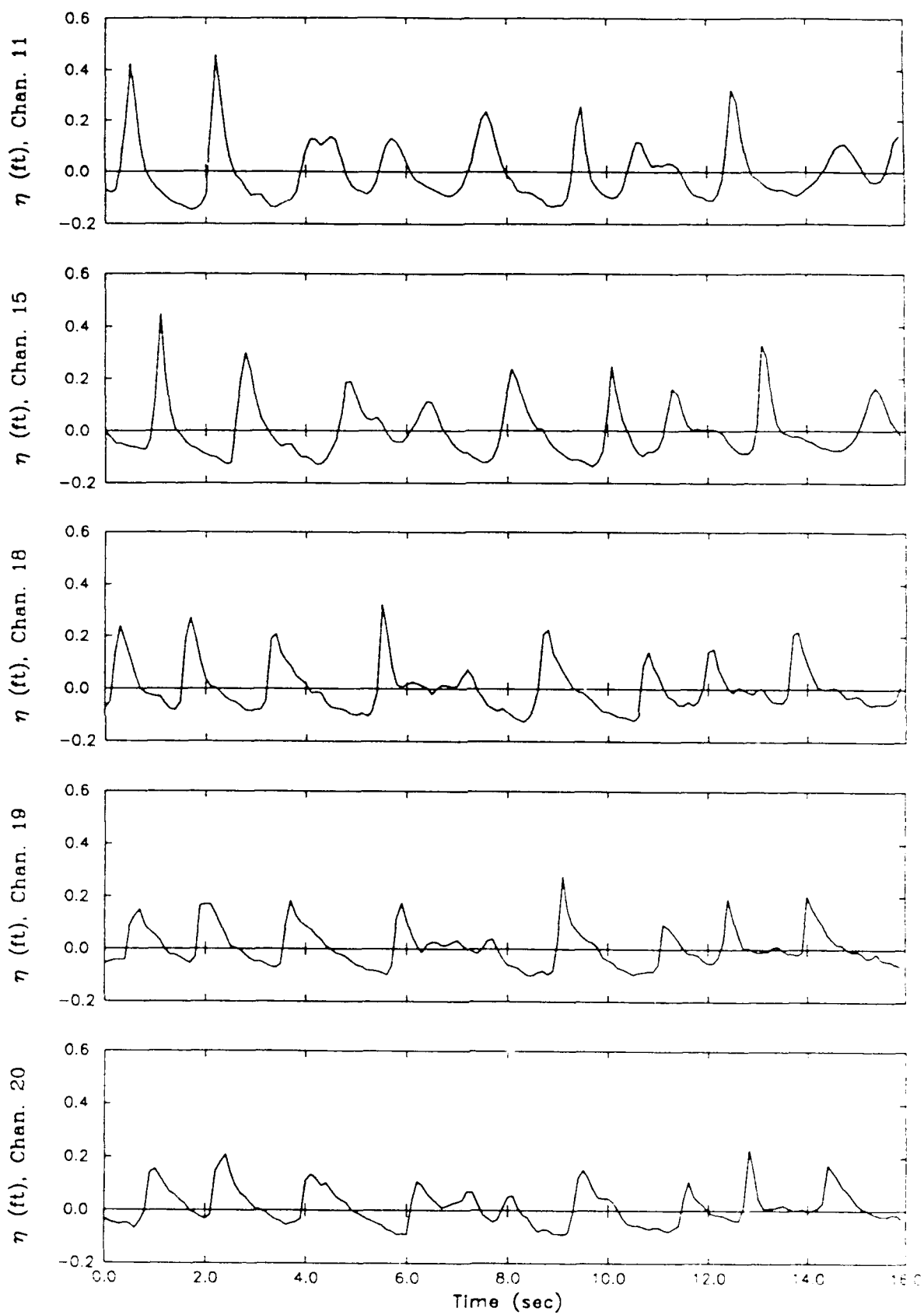
Generalized Beach Model, GBMD3902



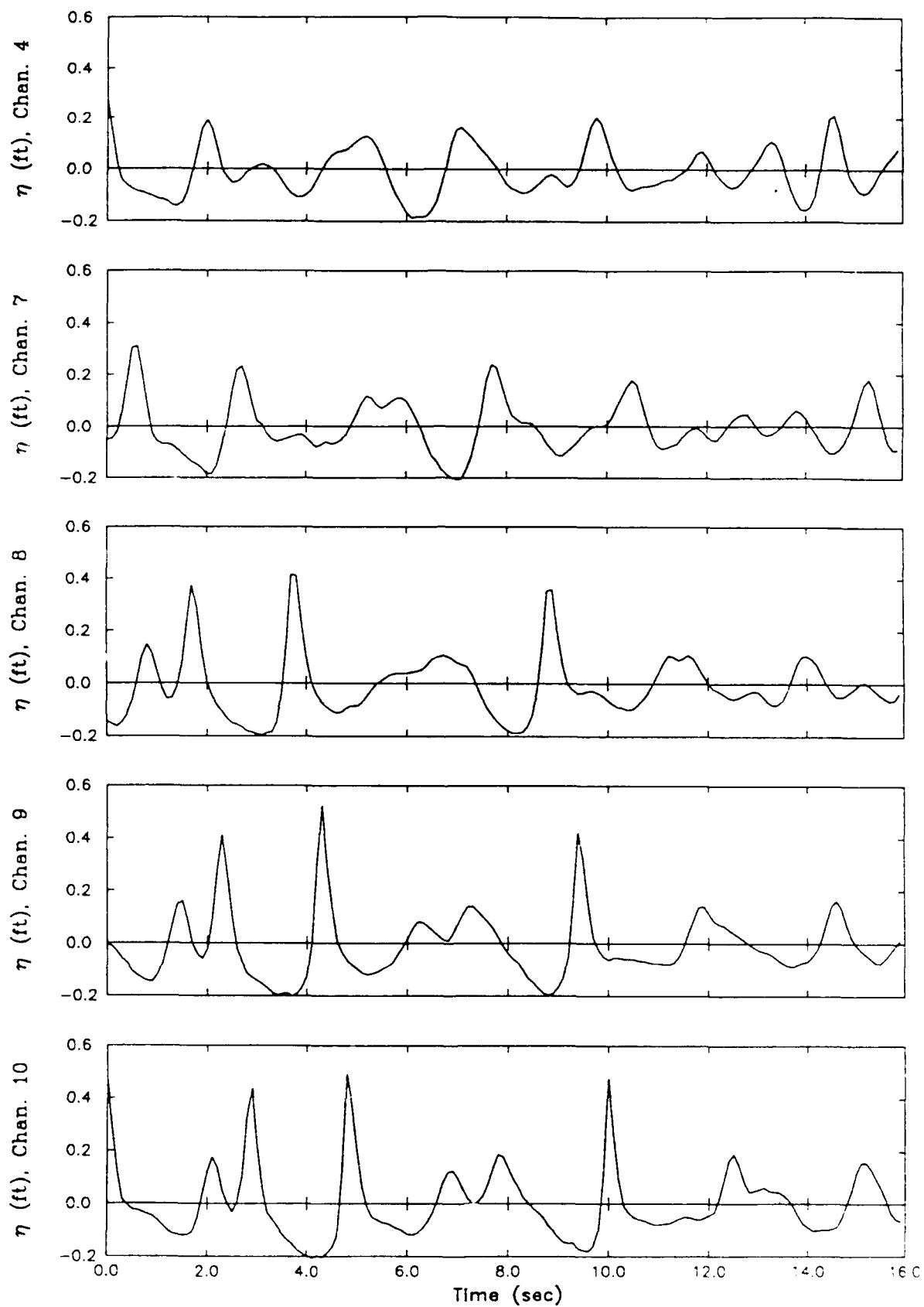
Generalized Beach Model, GBMD3902



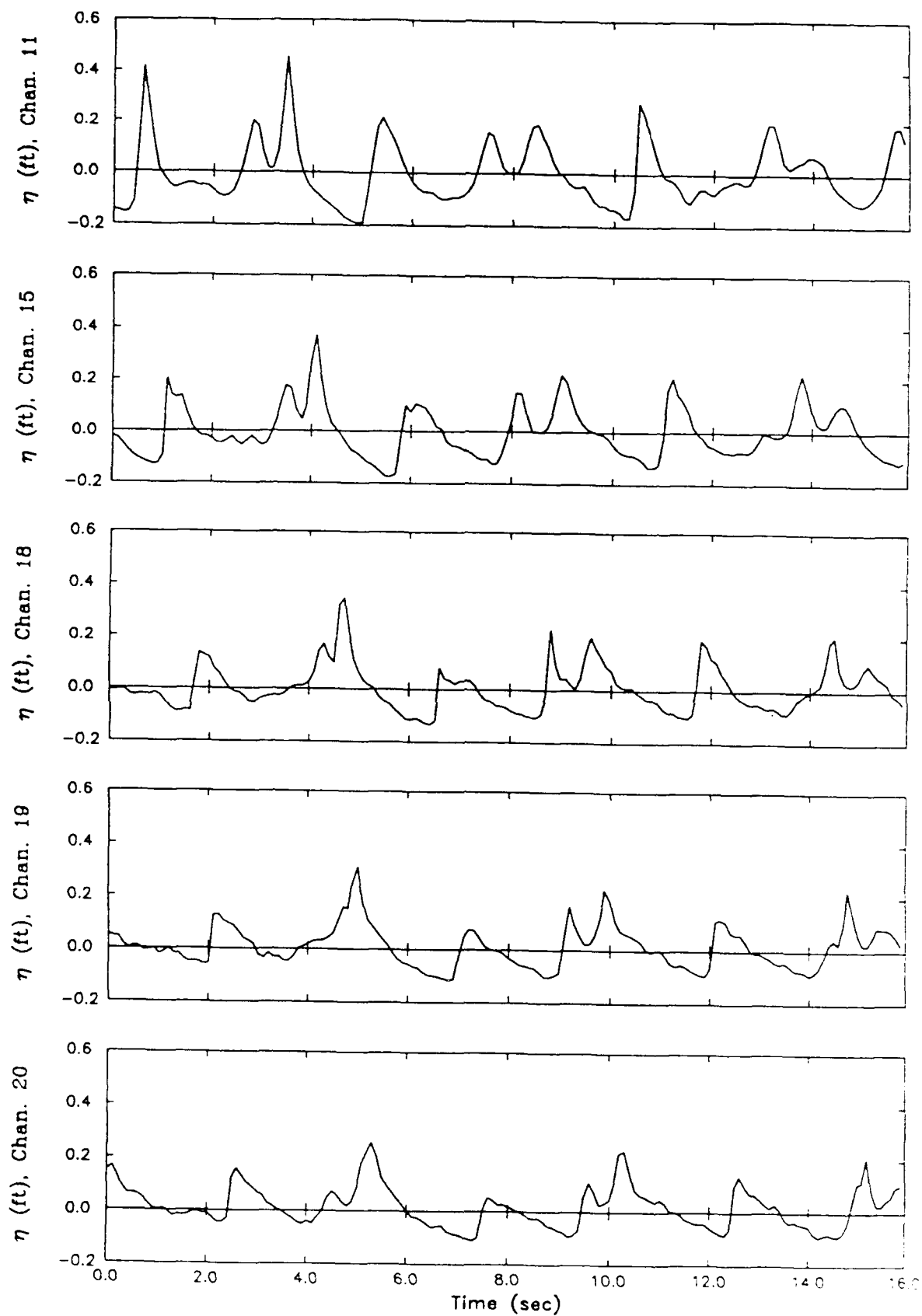
Generalized Beach Model, GBMD4302



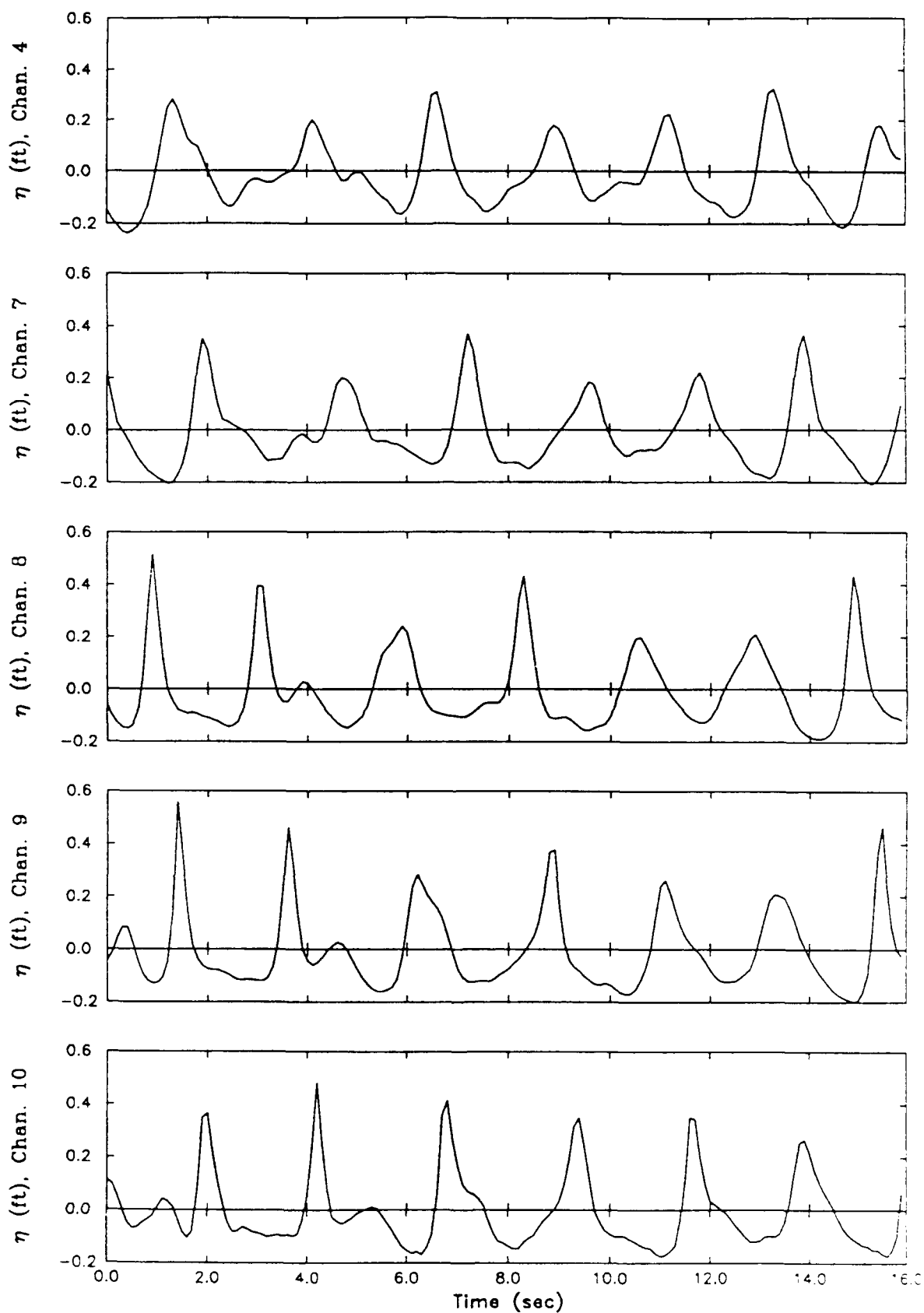
Generalized Beach Model, GBMD4302



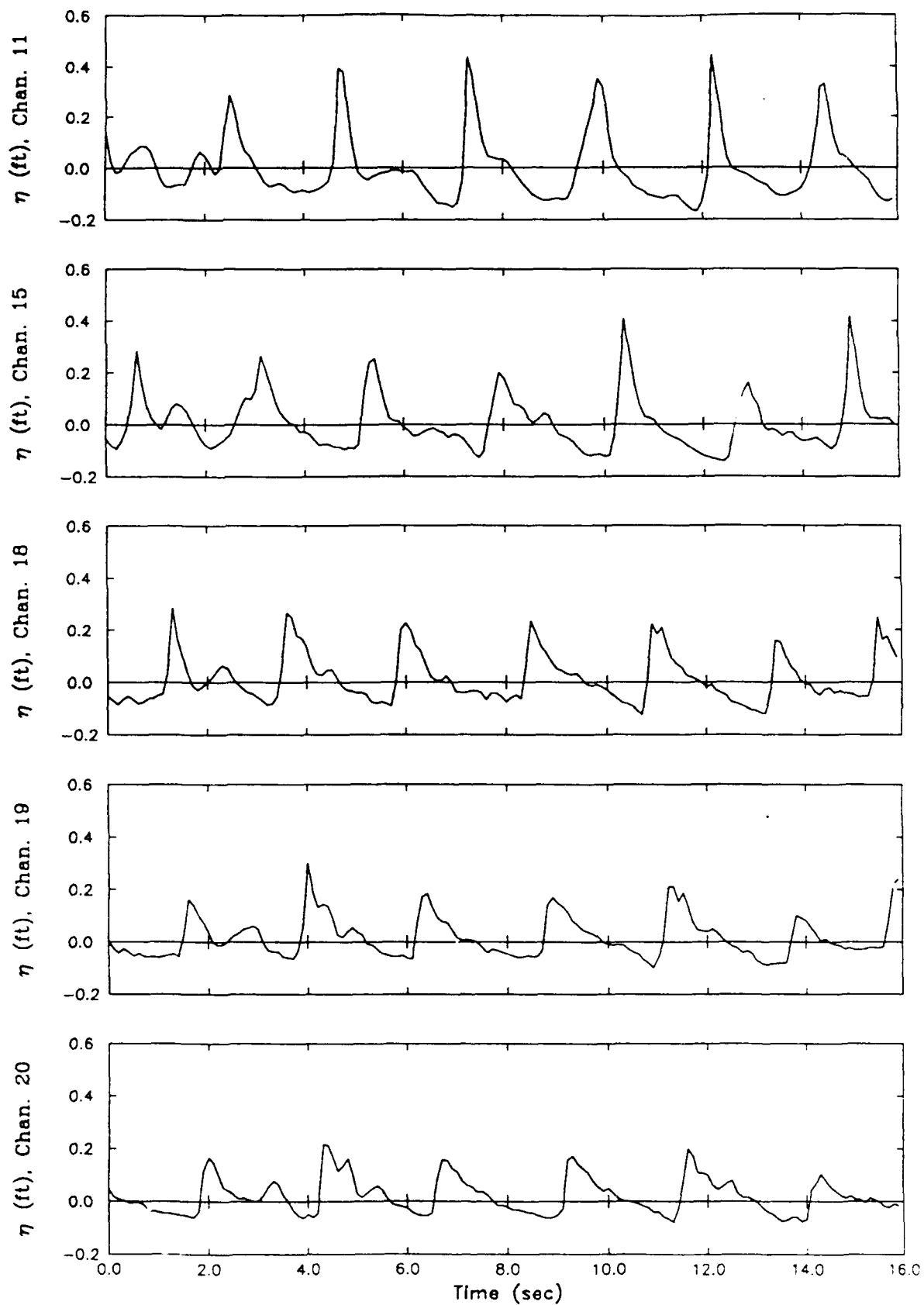
Generalized Beach Model, GBMD4602



Generalized Beach Model, GBMD4602

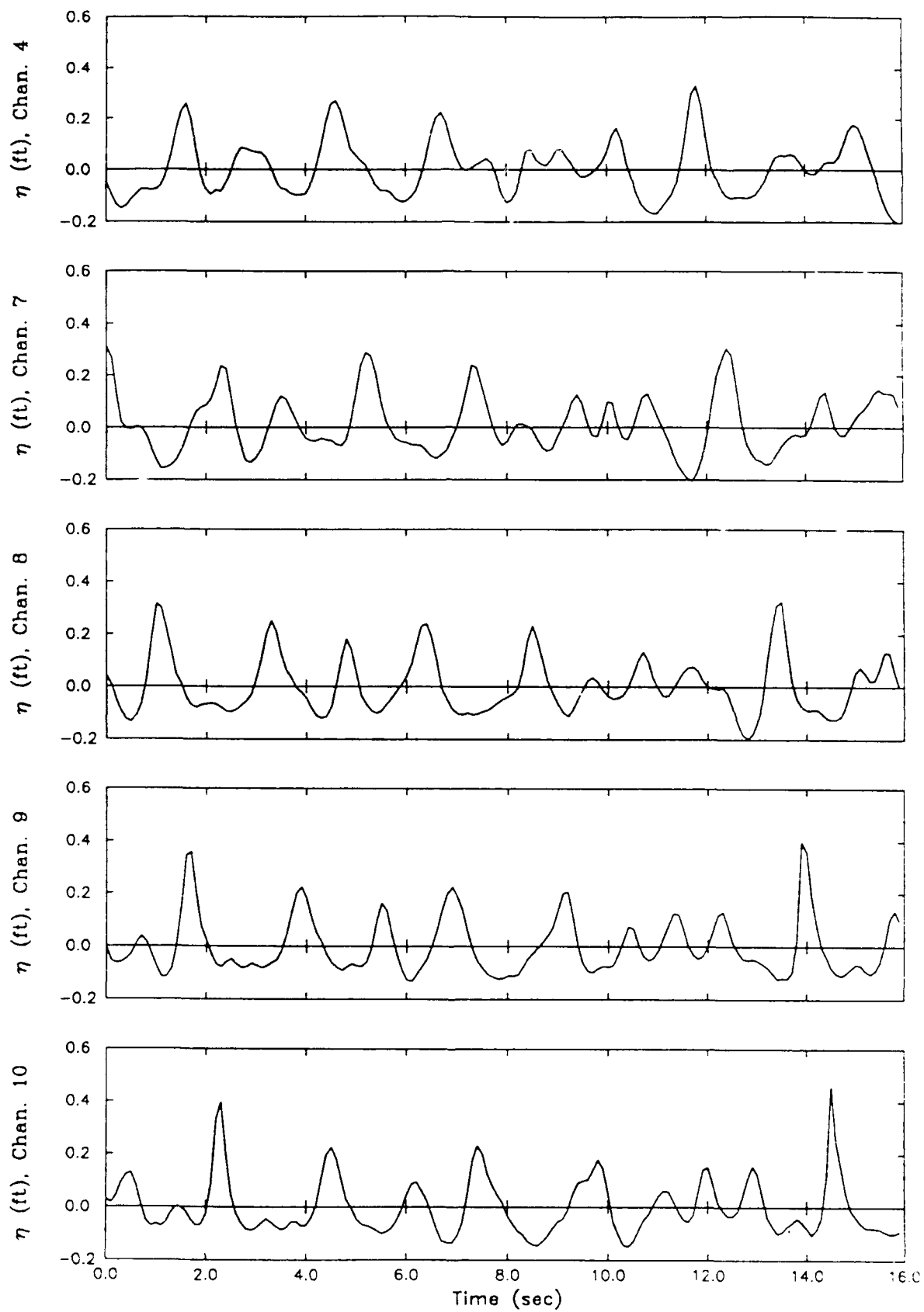


Generalized Beach Model, GBMD4902

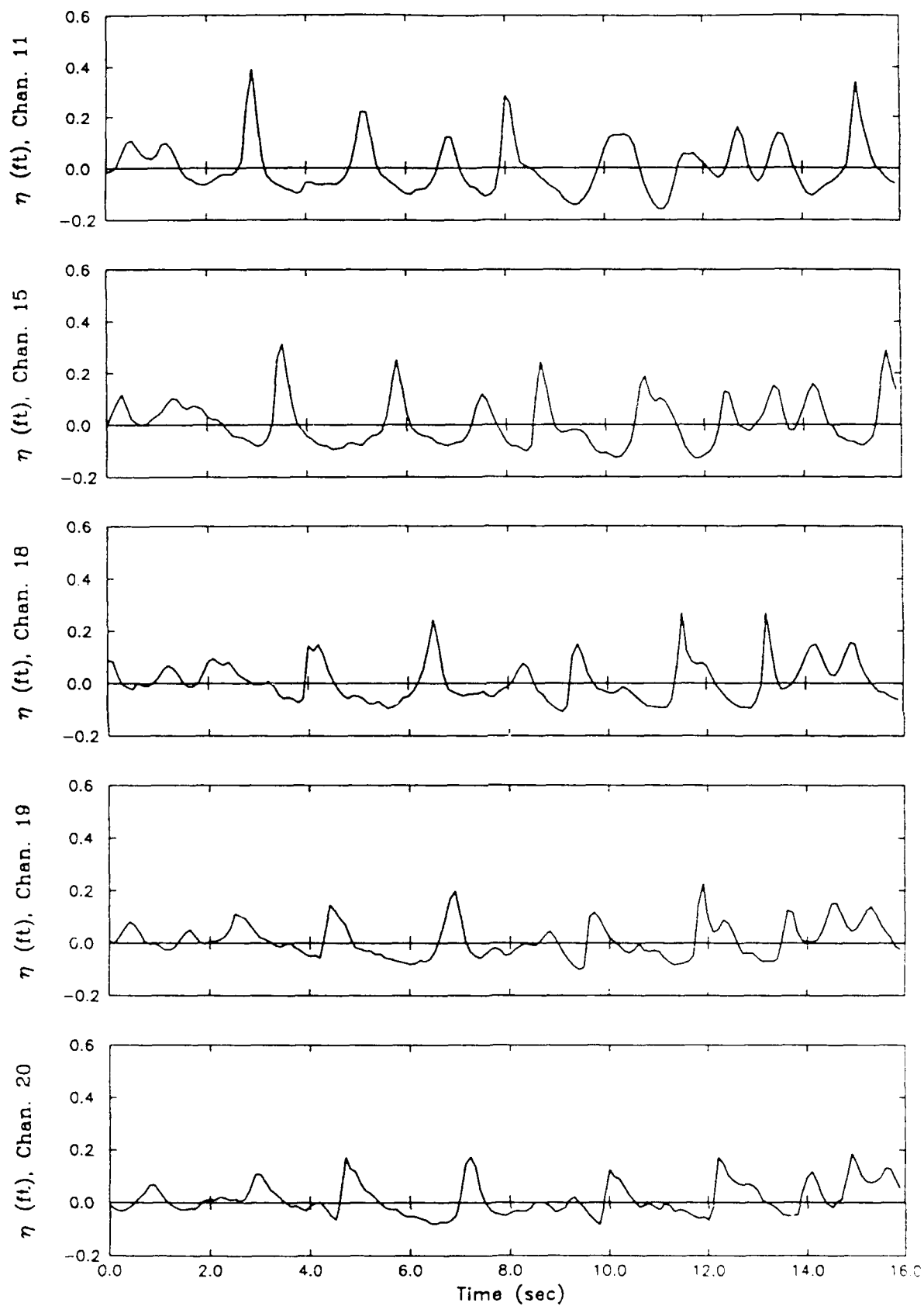


Generalized Beach Model, GBMD4902

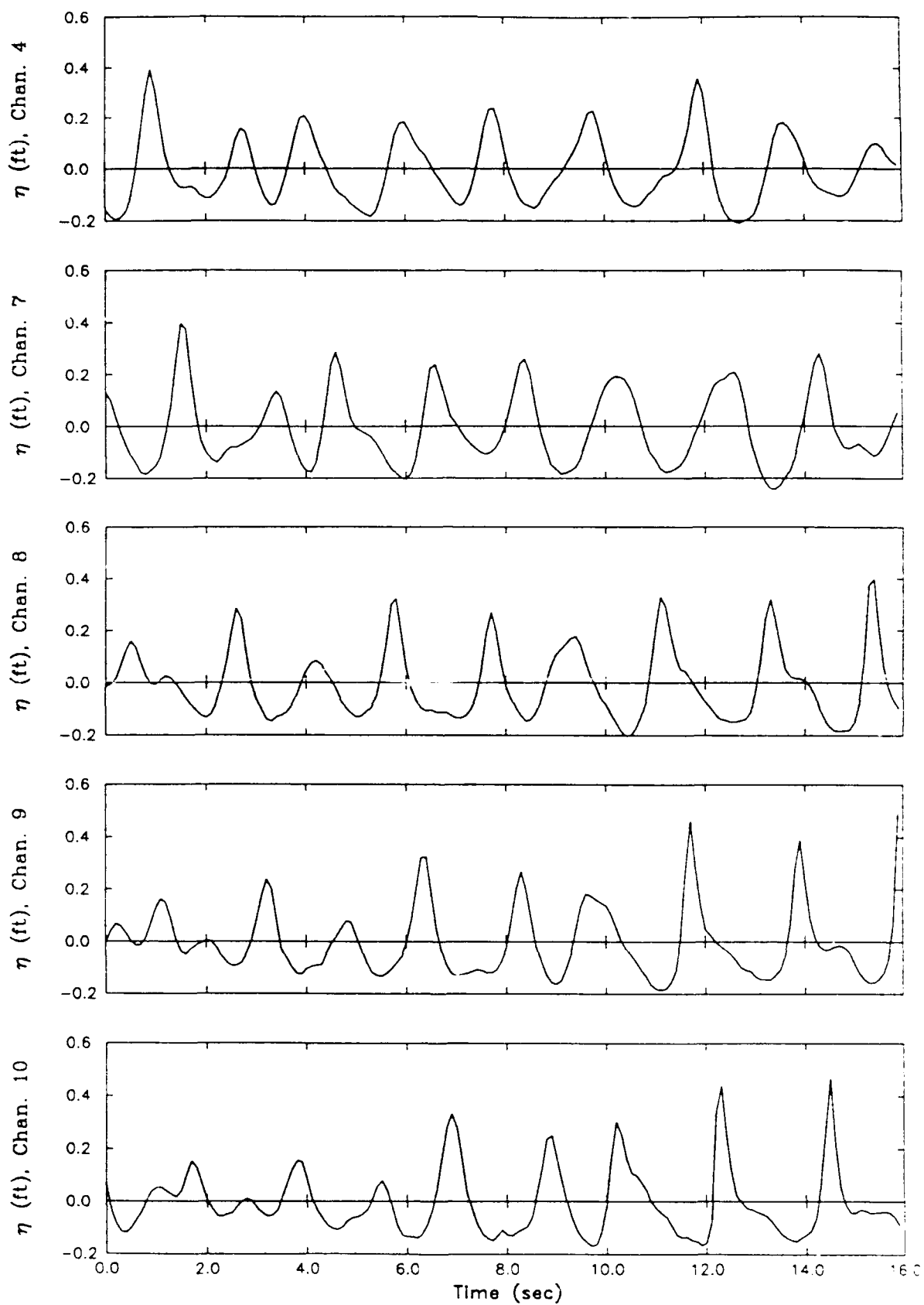




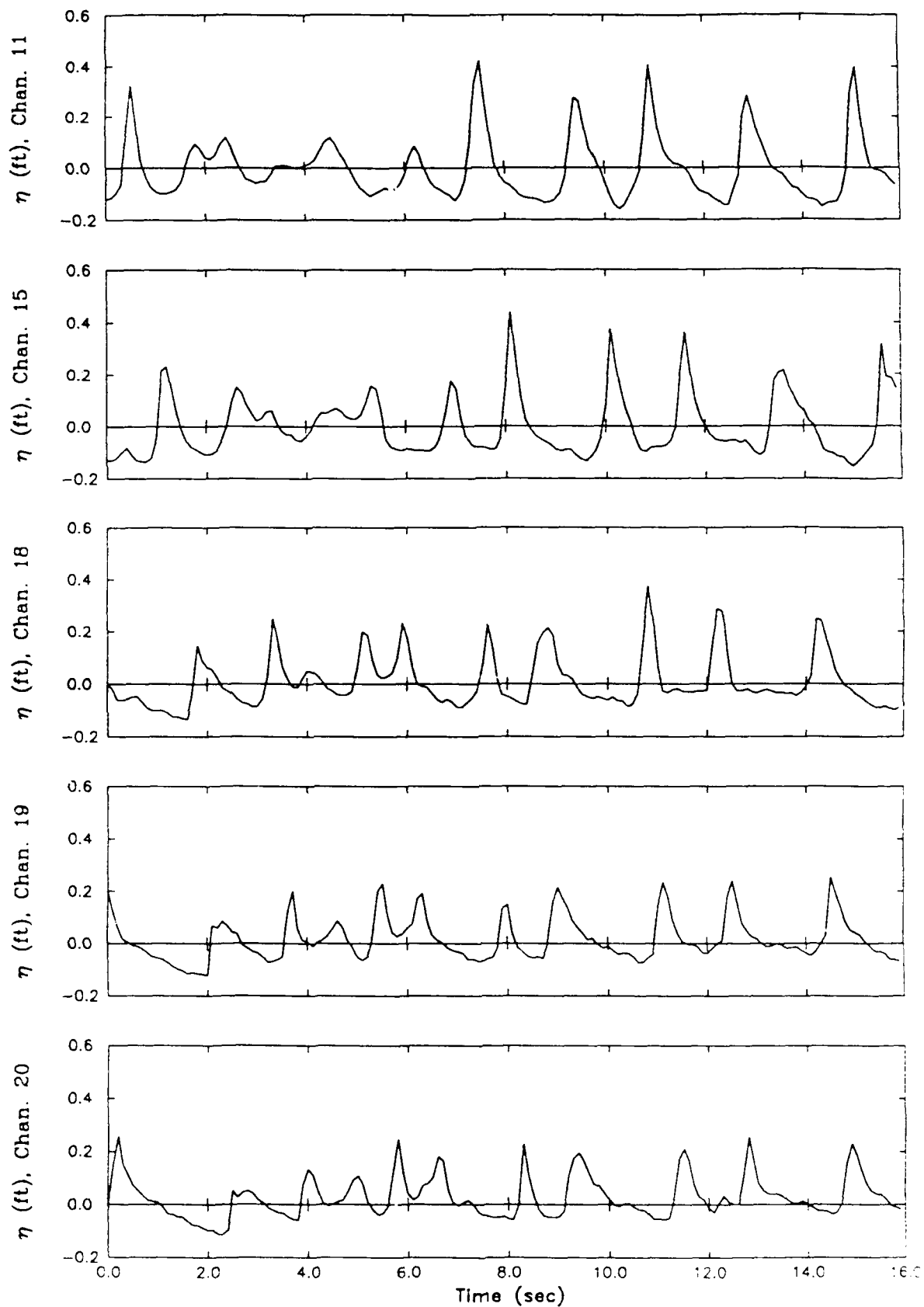
Generalized Beach Model, GBMD5102



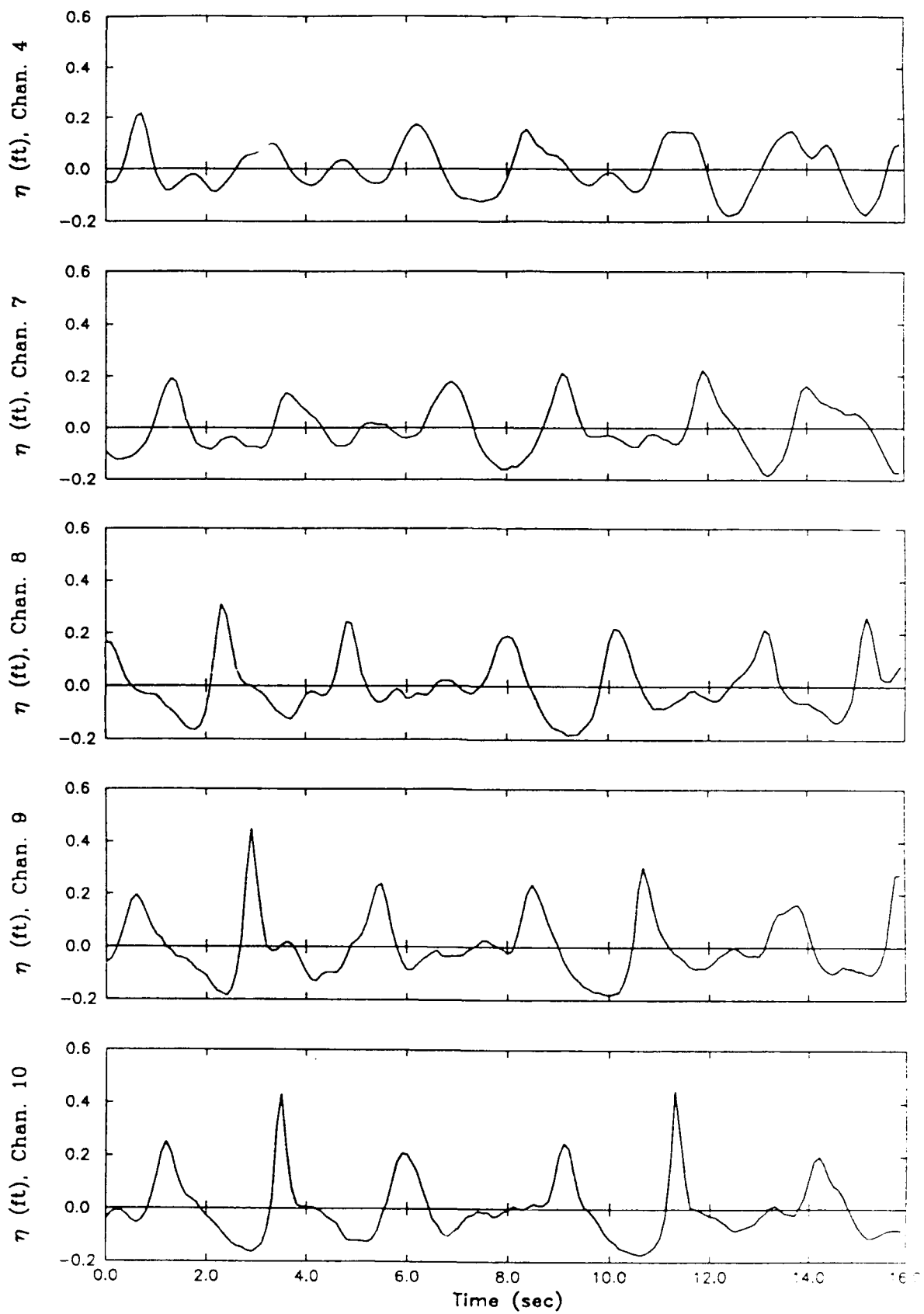
Generalized Beach Model, GBMD5102



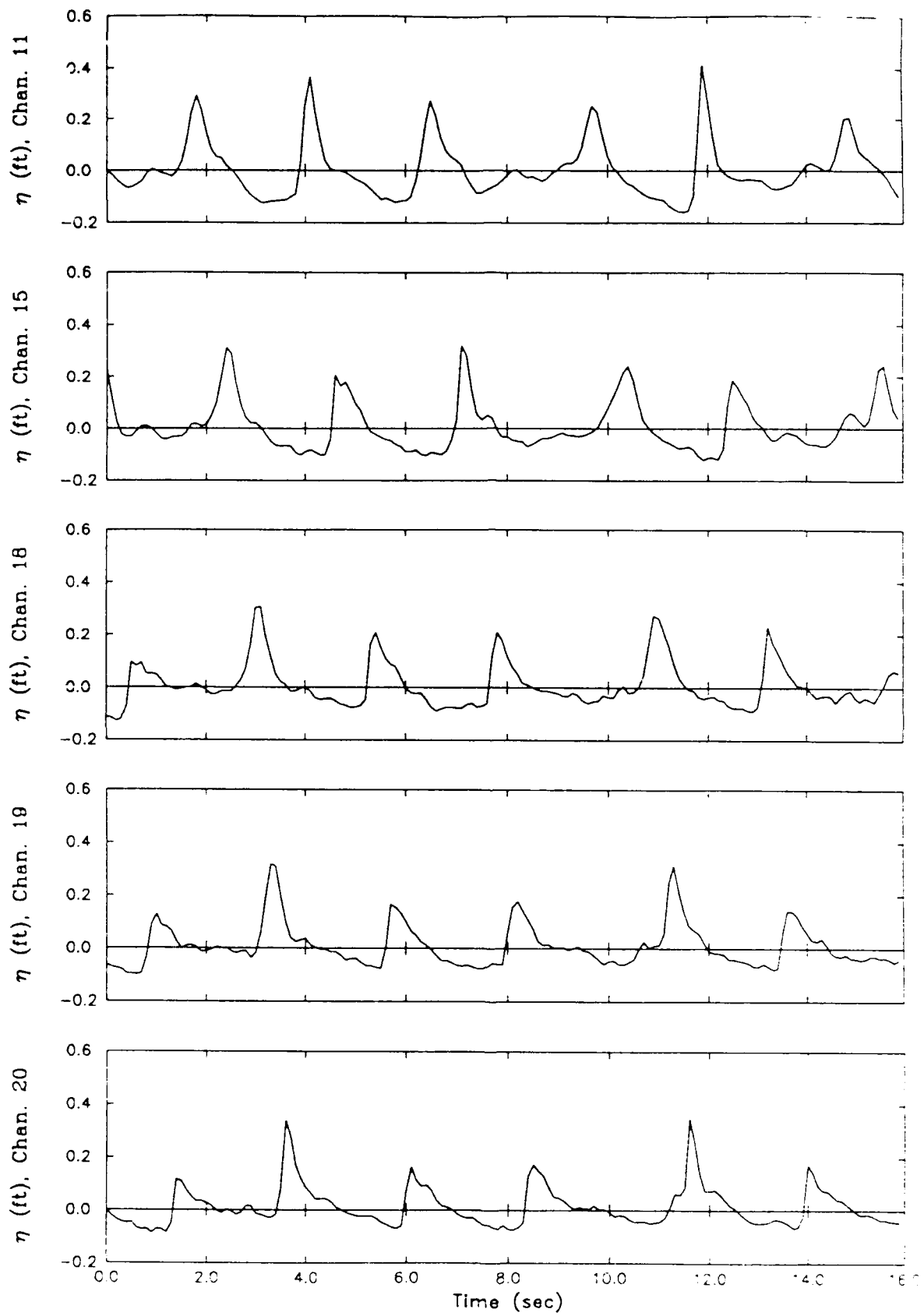
Generalized Beach Model, GBMD5202



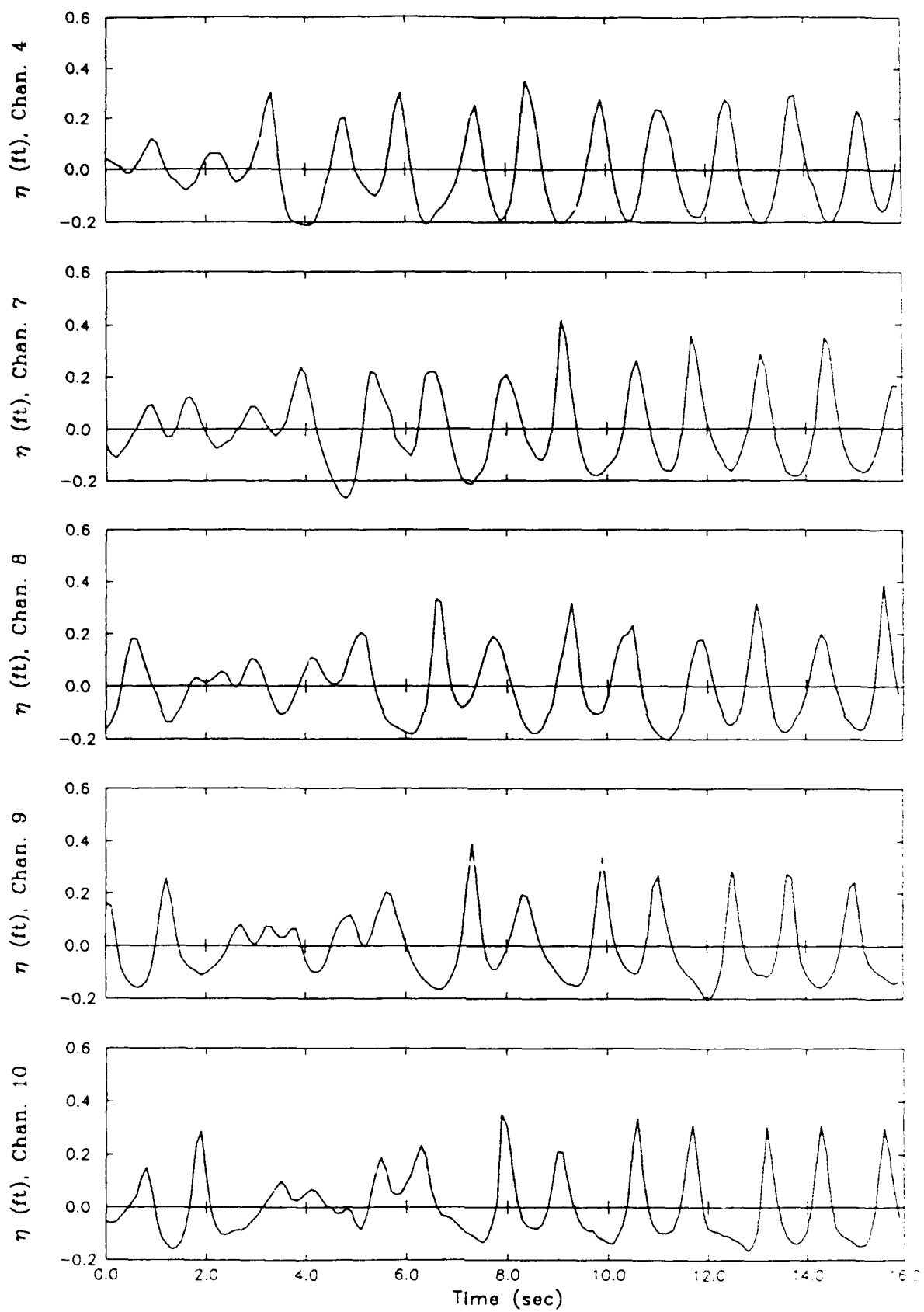
Generalized Beach Model, GBMD5202



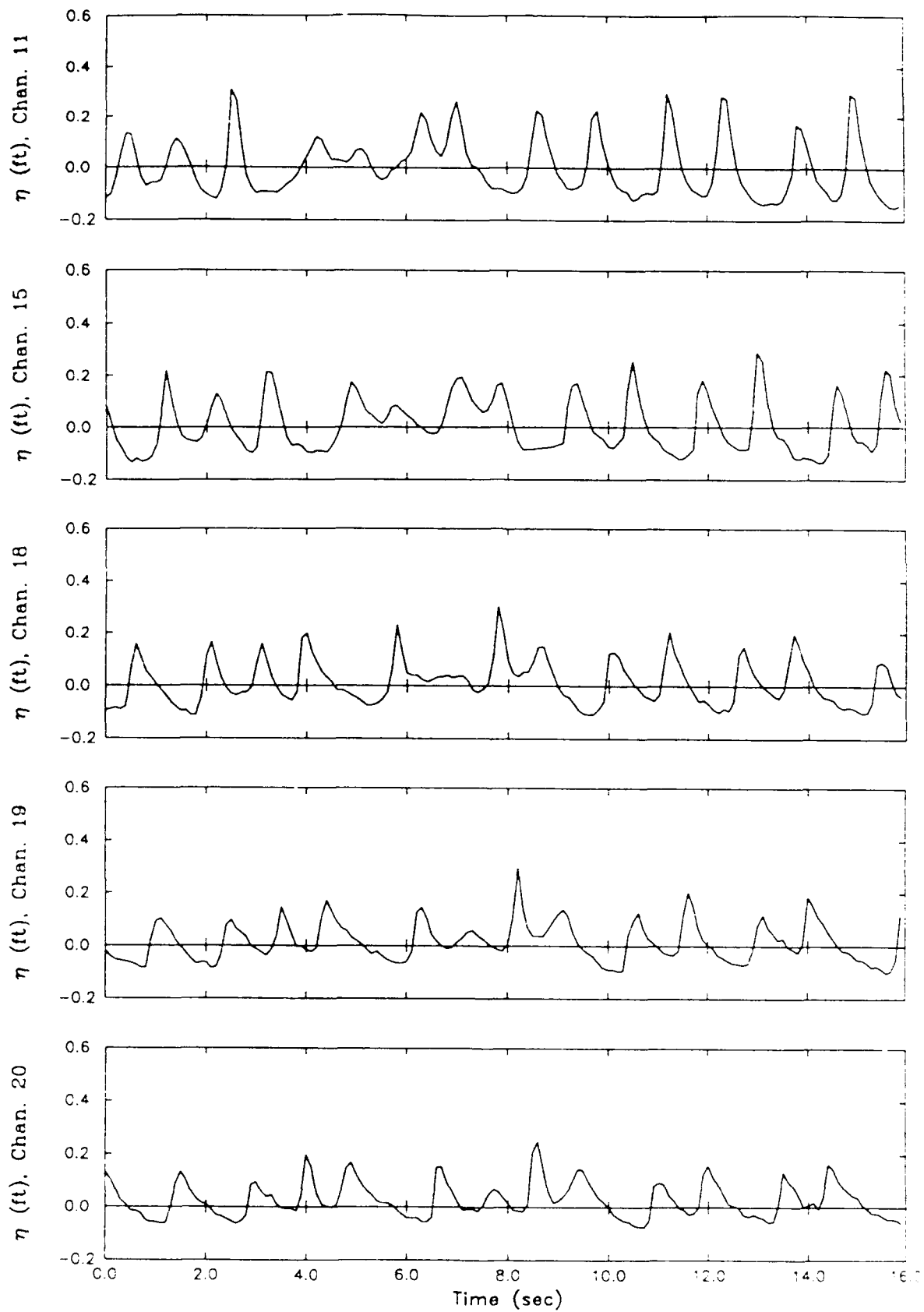
Generalized Beach Model, GPMD5302



Generalized Beach Model, GBMD5302

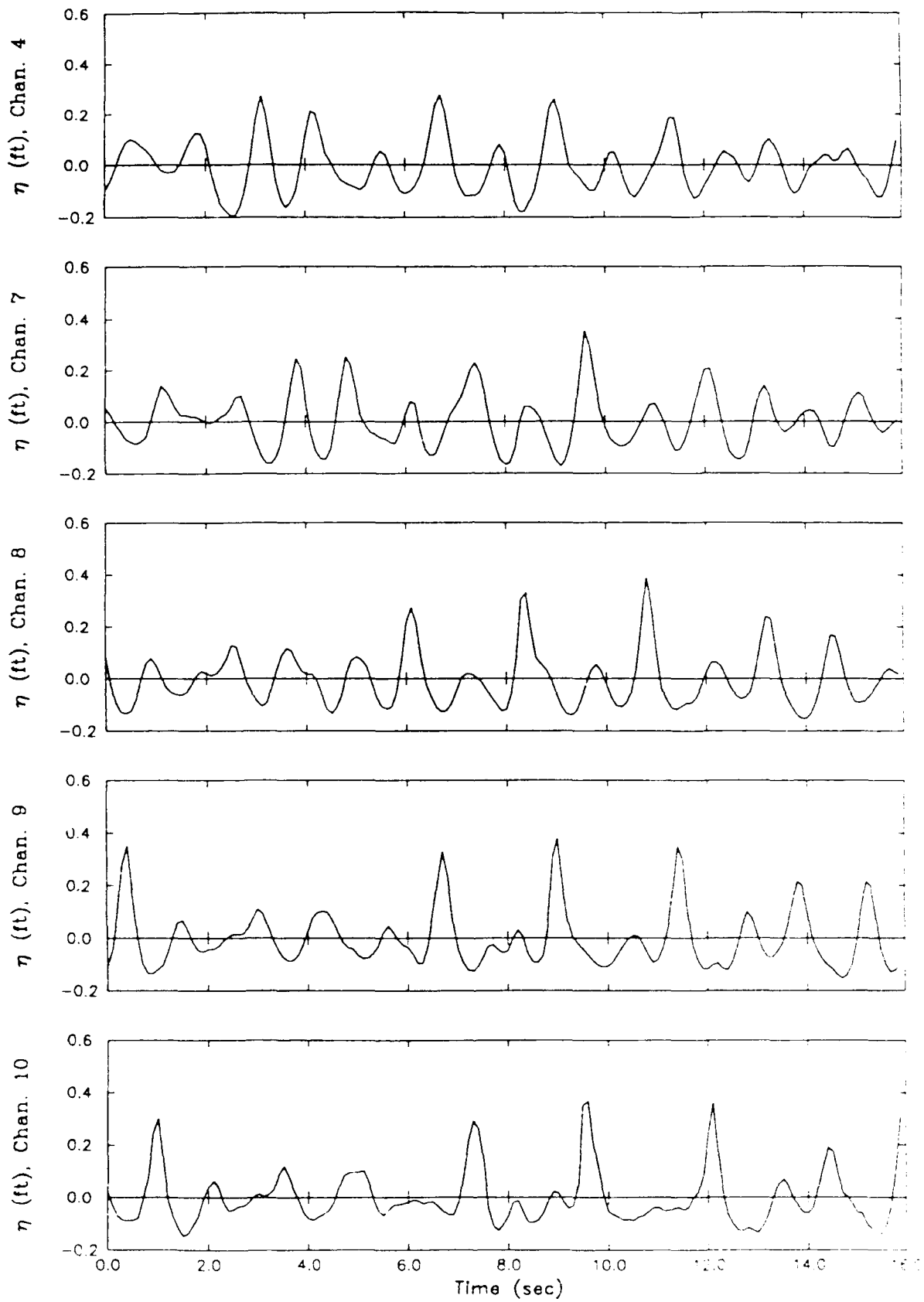


Generalized Beach Model, GBMD6103

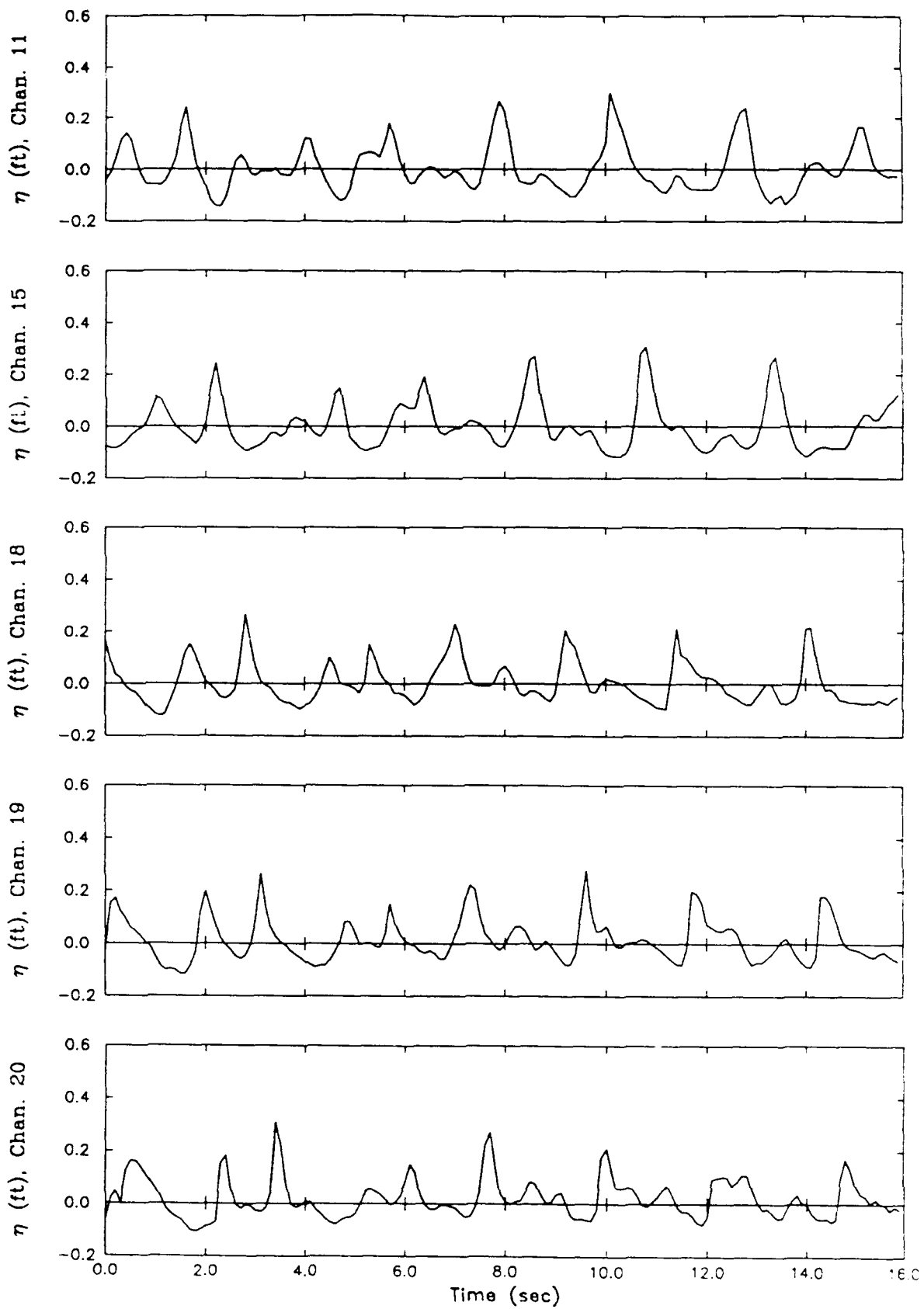


Generalized Beach Model, GBMD6103

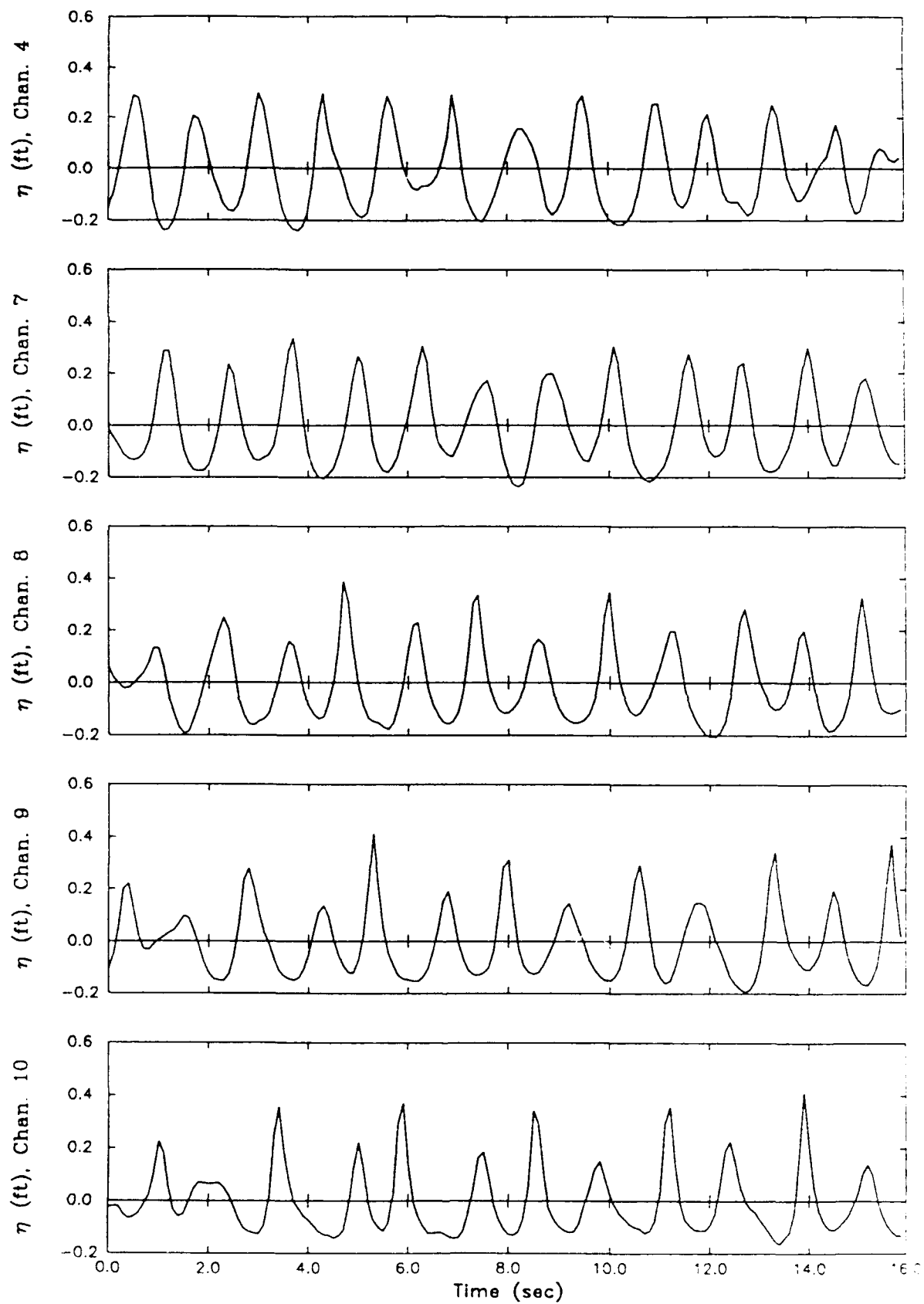




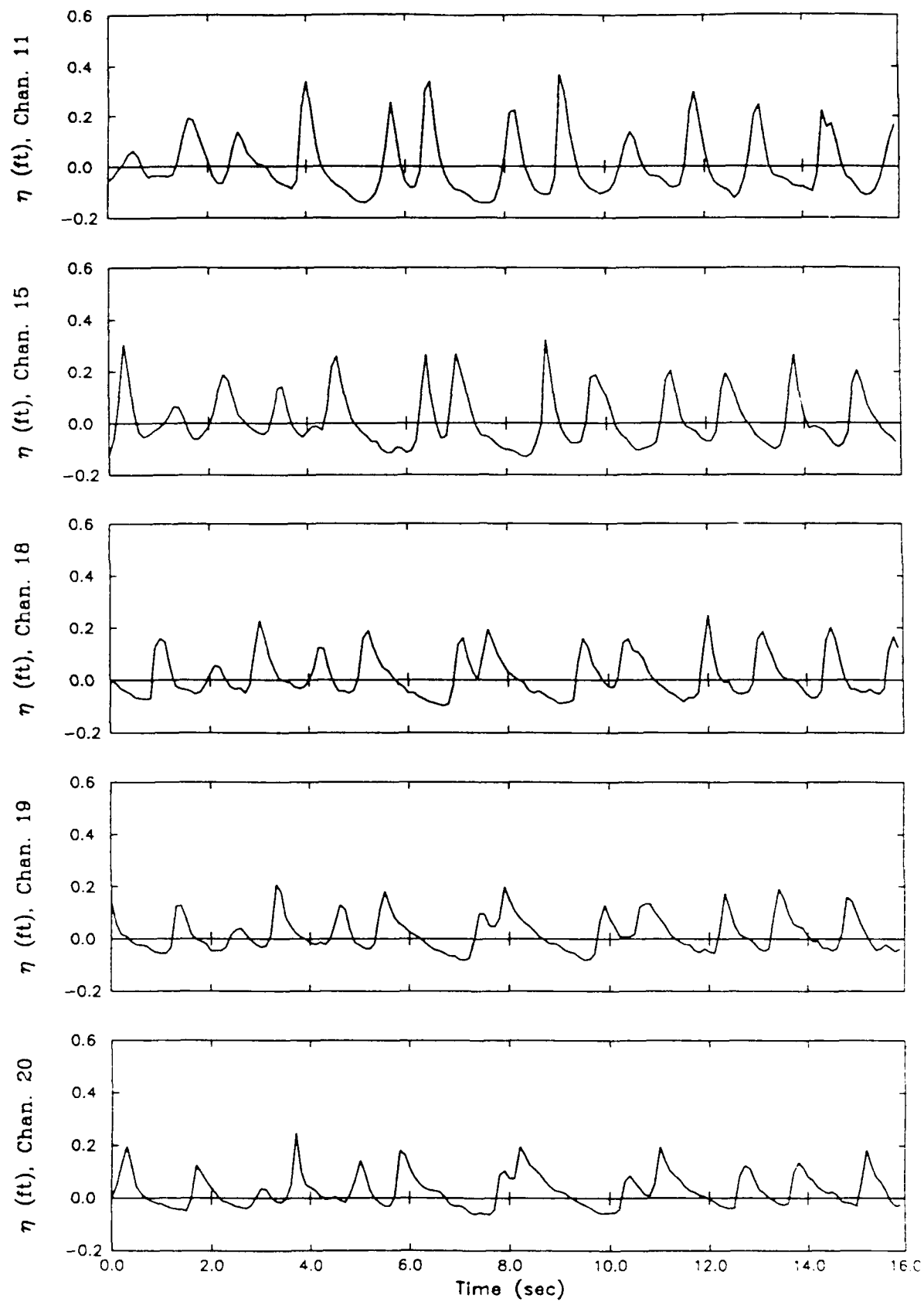
Generalized Beach Model, GBMD6203



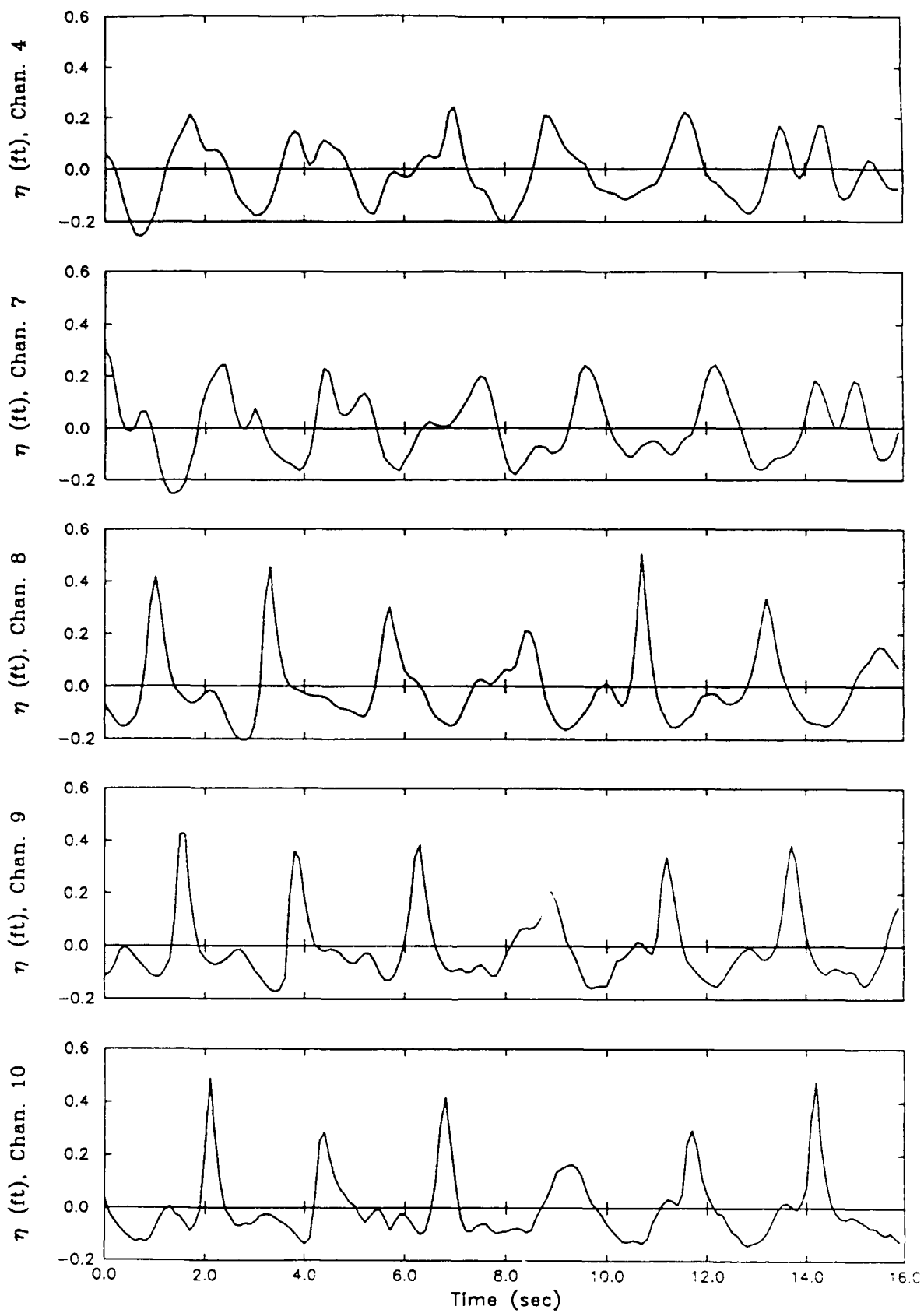
Generalized Beach Model, GBMD6203



Generalized Beach Model, GBMD6303

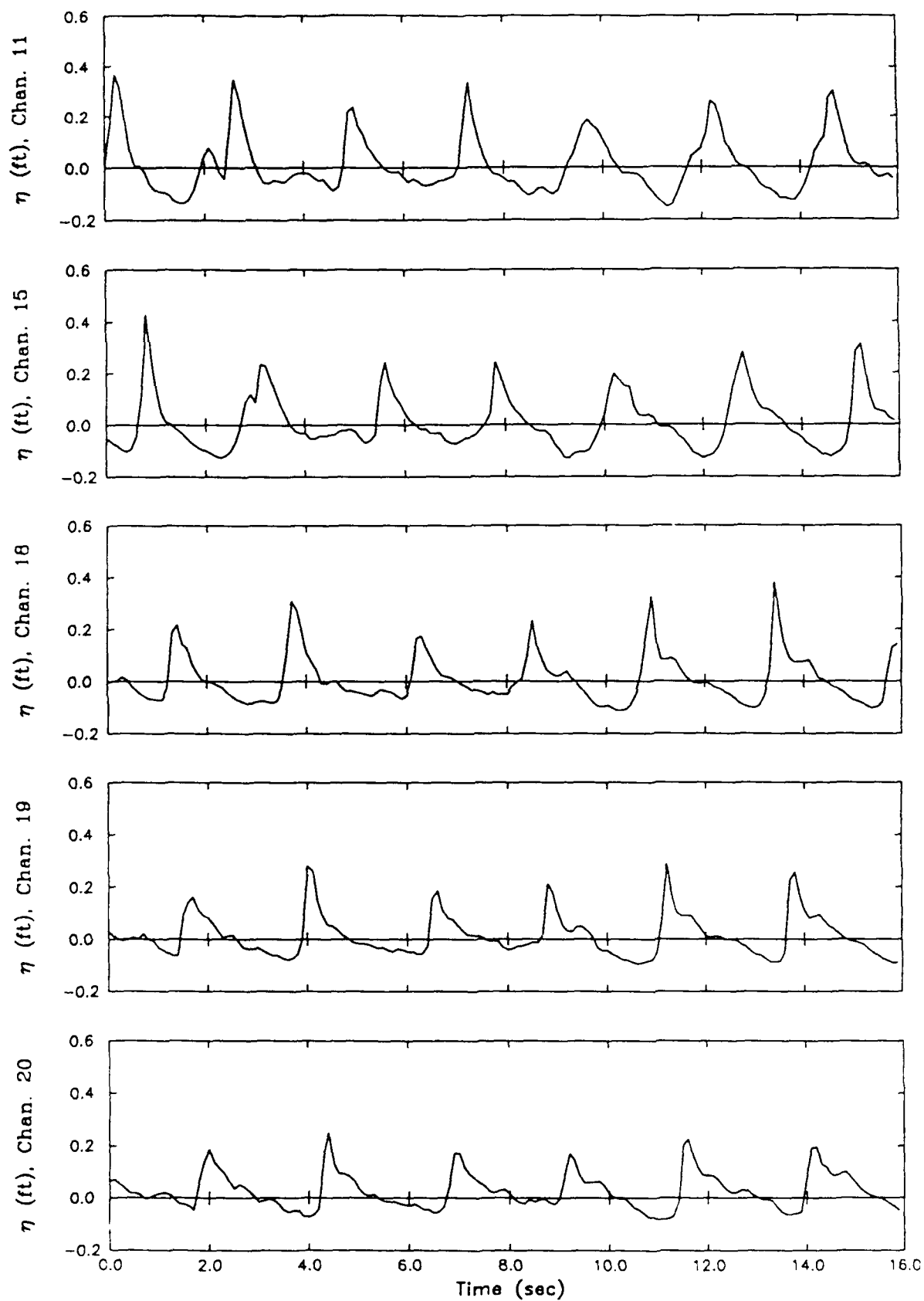


Generalized Beach Model, GBMD6303

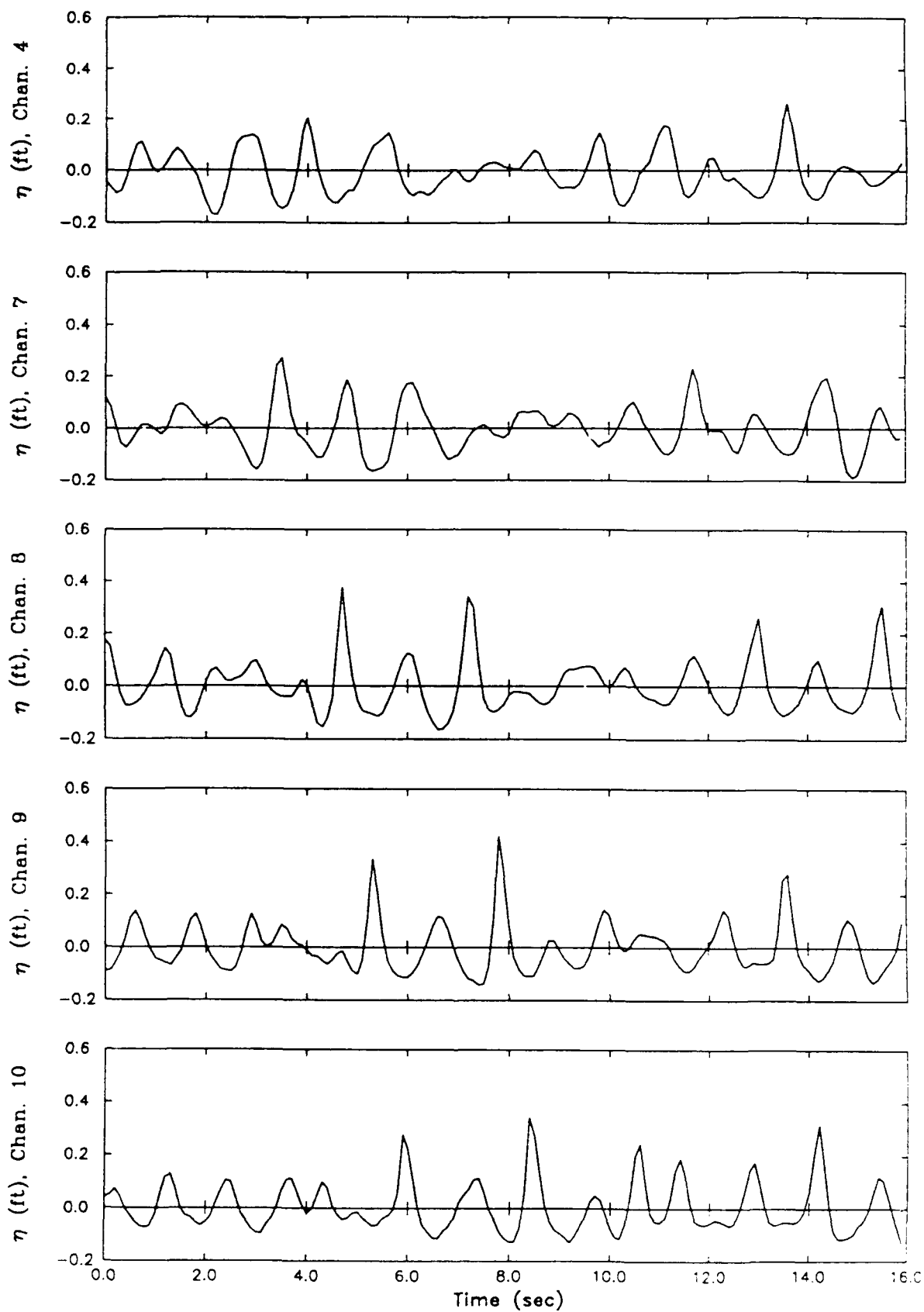


Generalized Beach Model, GBMD6403

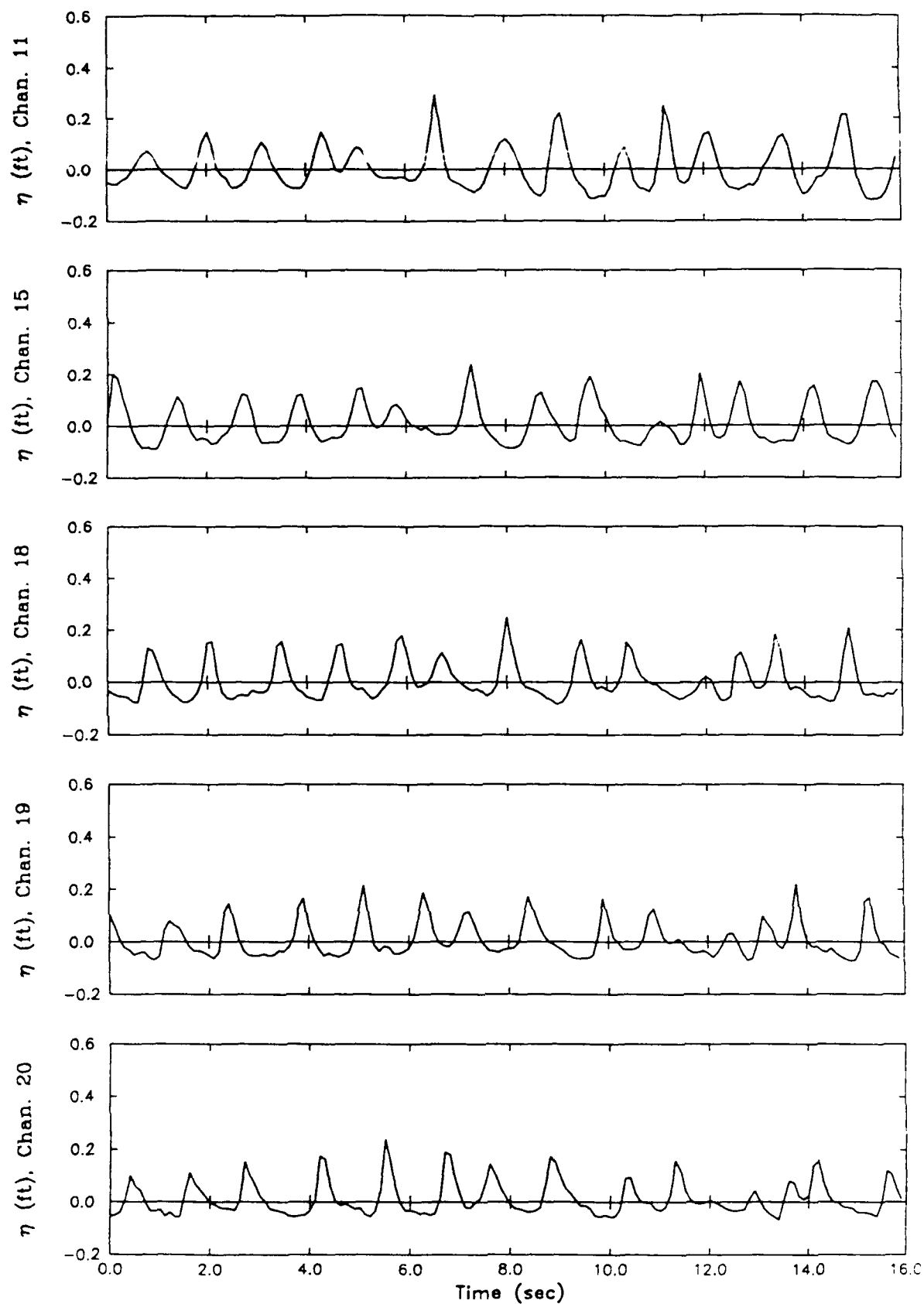
D80



Generalized Beach Model, GBMD6403

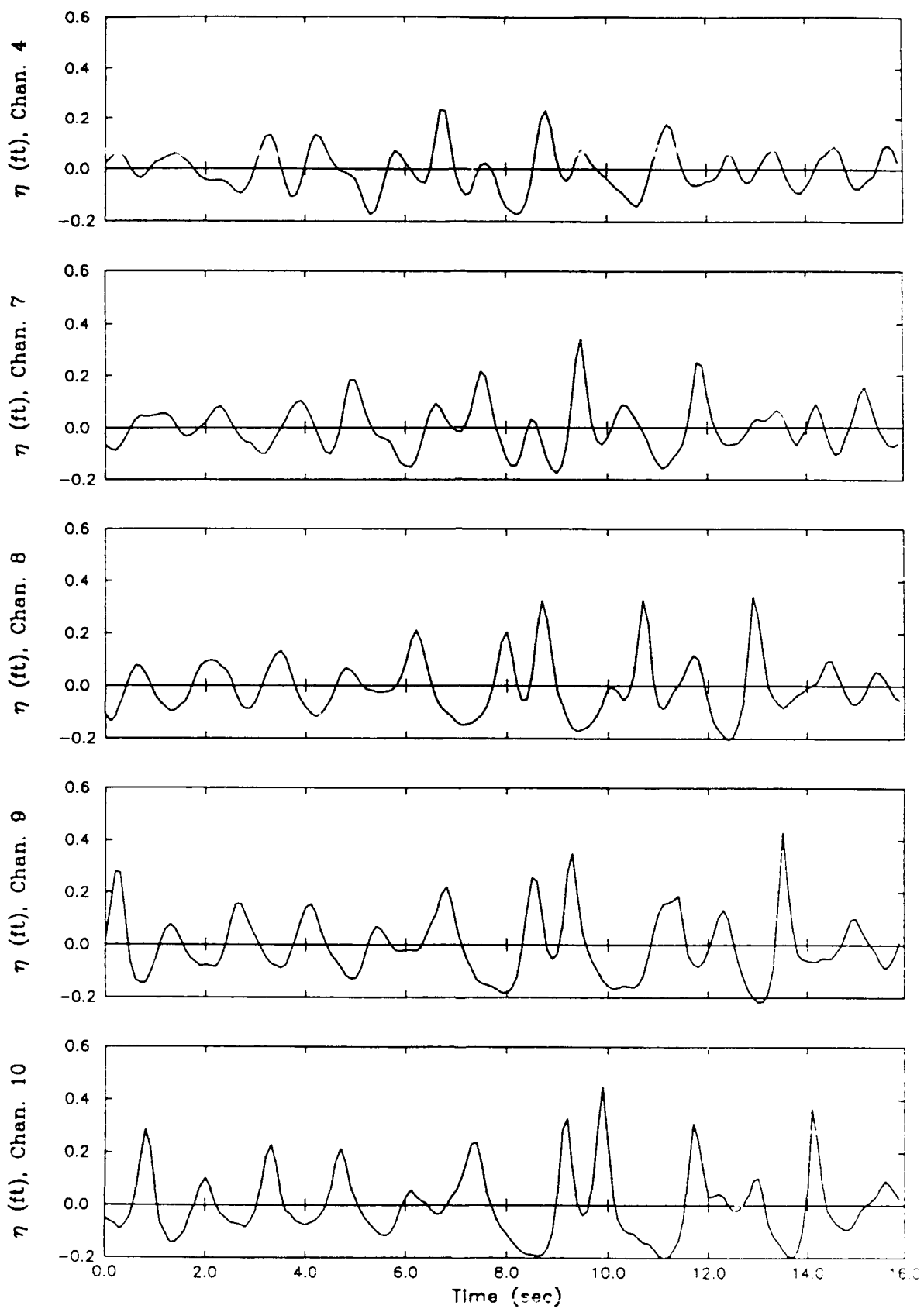


Generalized Beach Model, GBMD6503

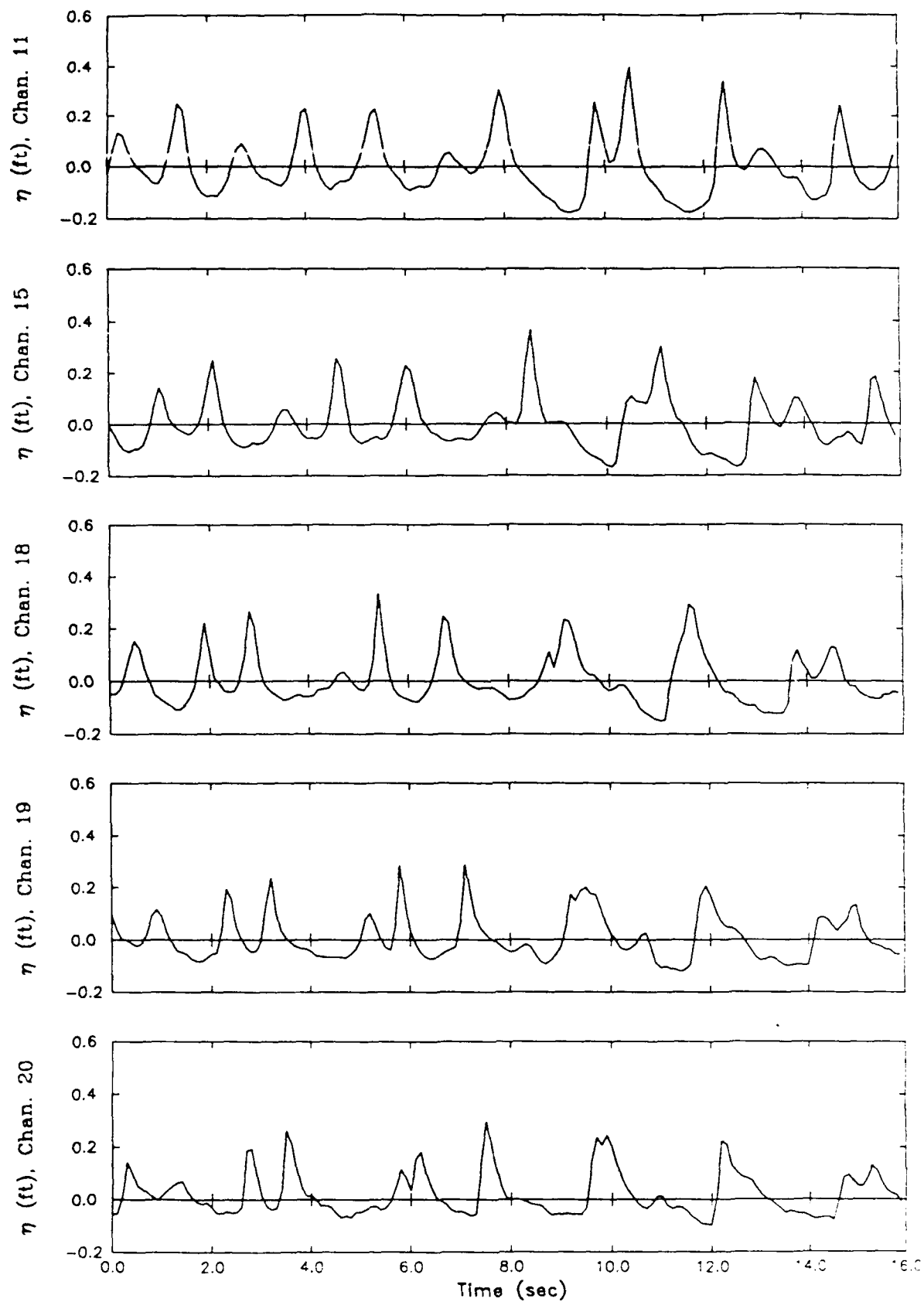


Generalized Beach Model, GBMD6503

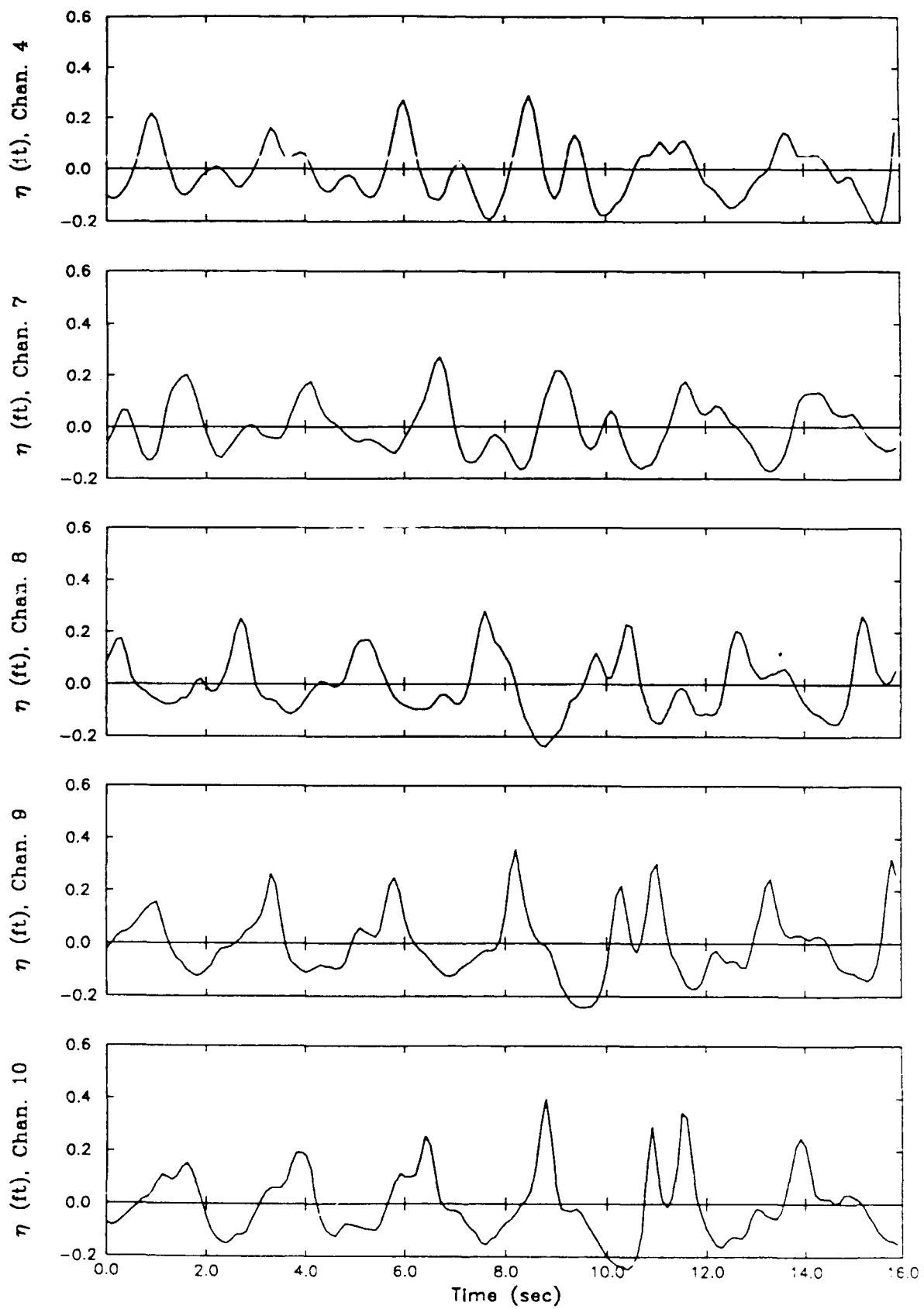




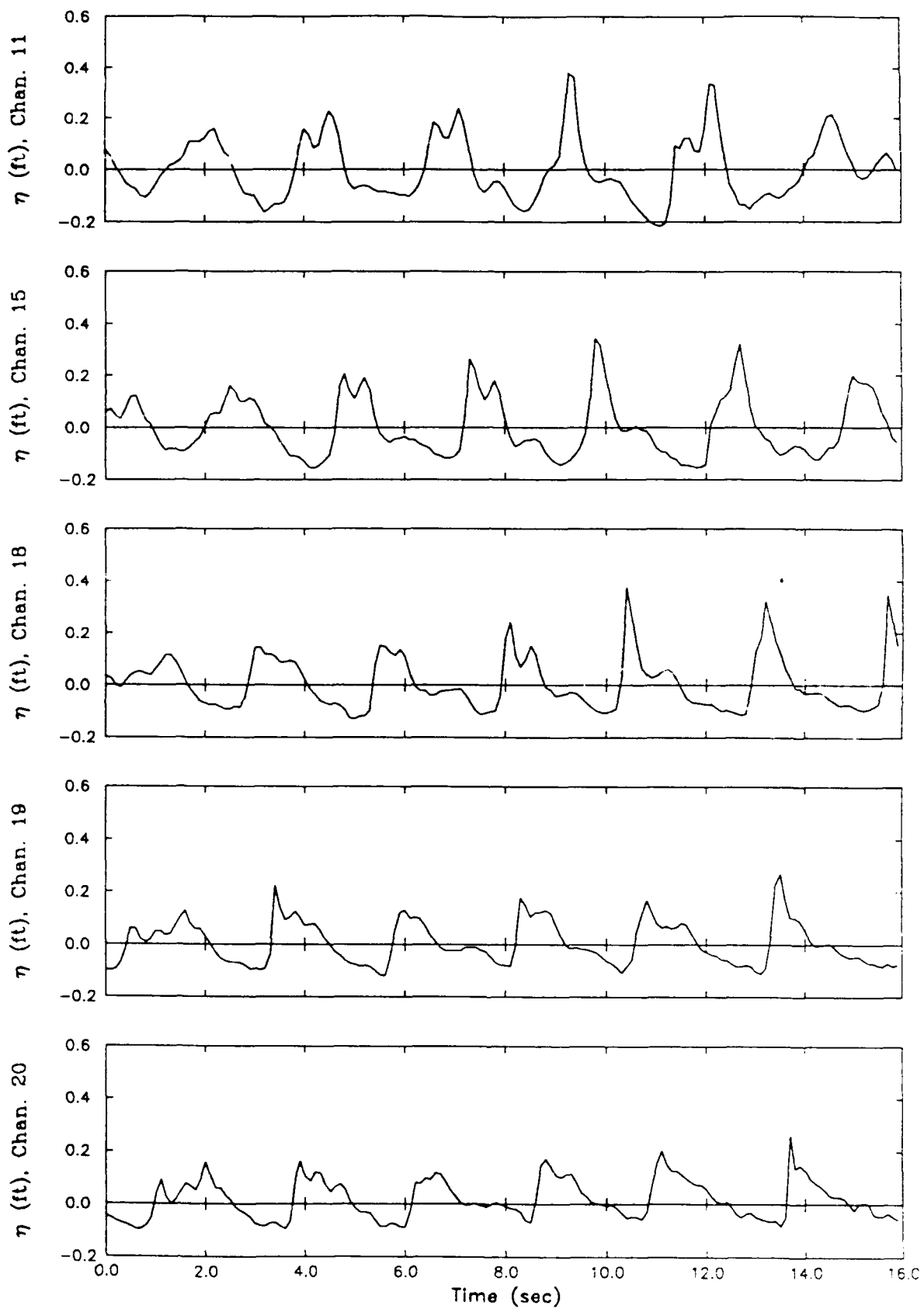
Generalized Beach Model, GBMD6603



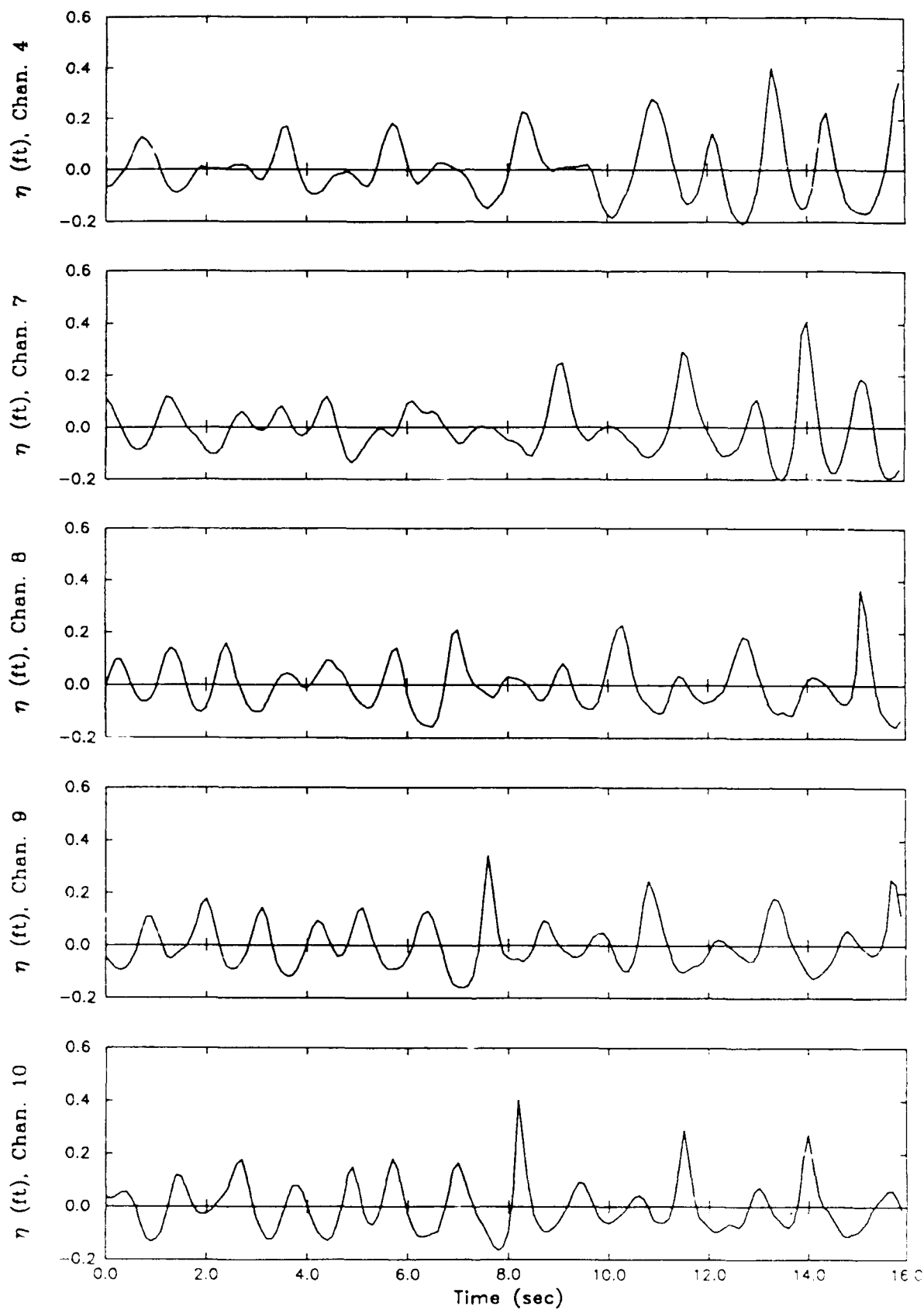
Generalized Beach Model, GBMD6603



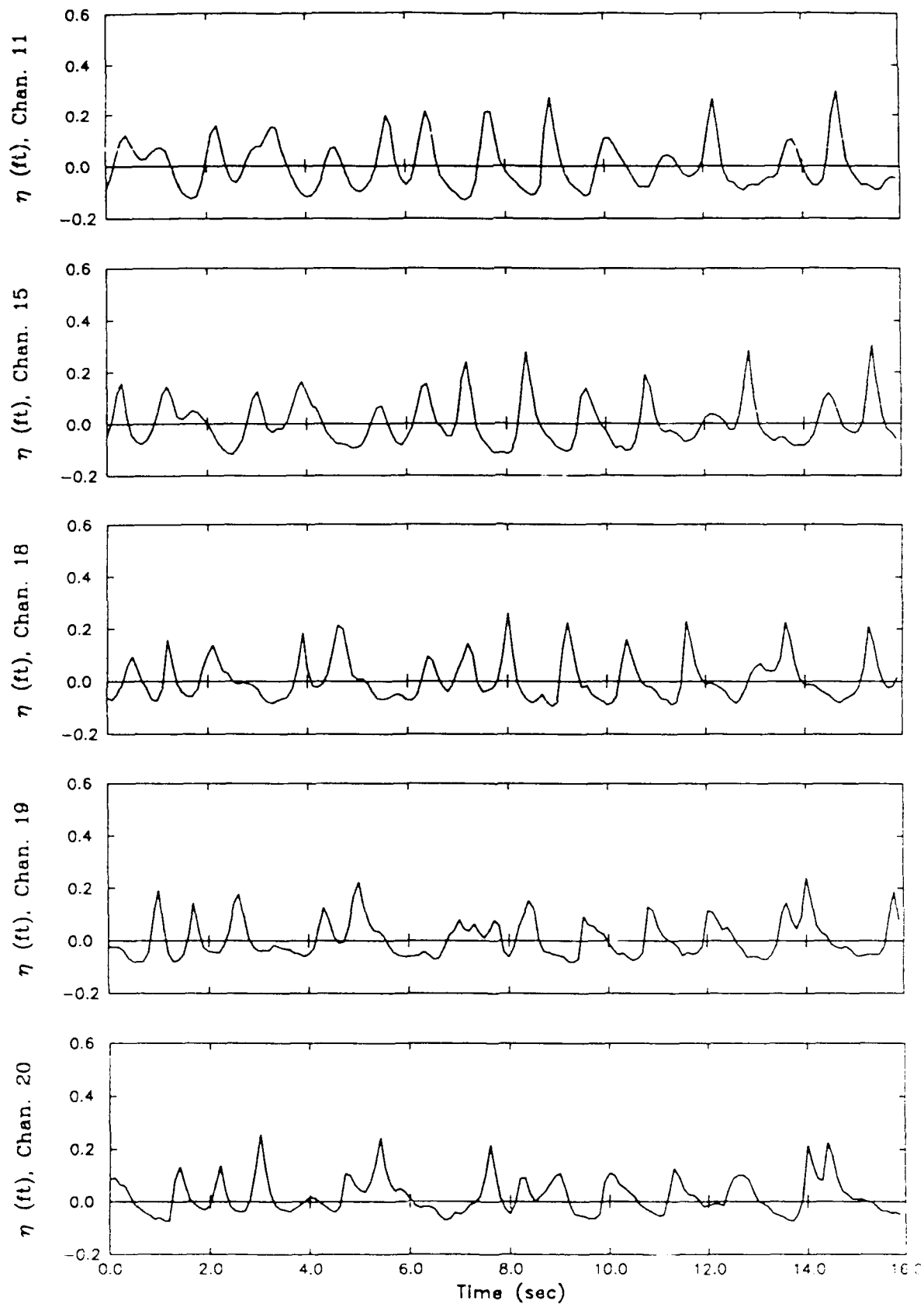
Generalized Beach Model, GBMD6703



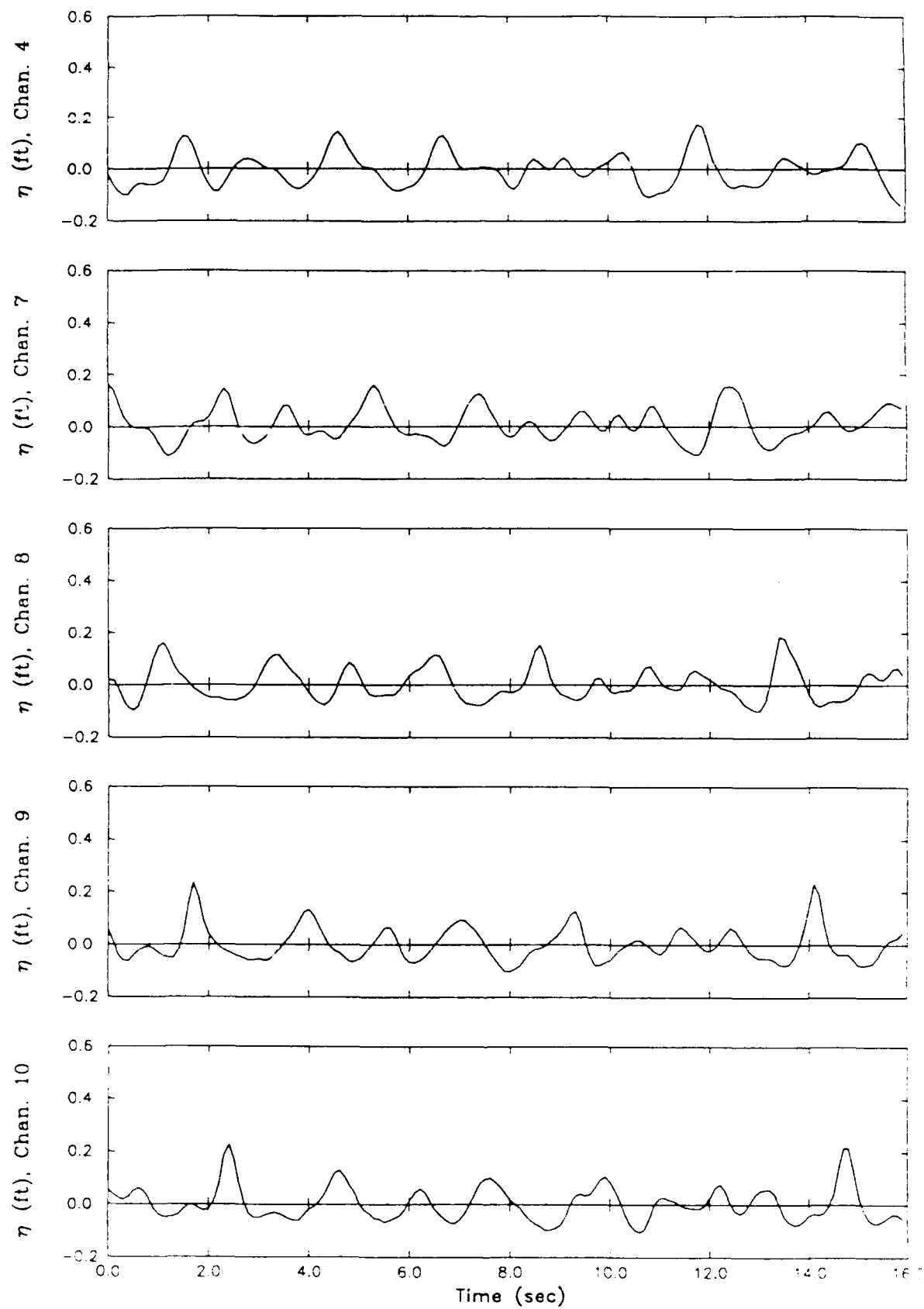
Generalized Beach Model, GBMD6703



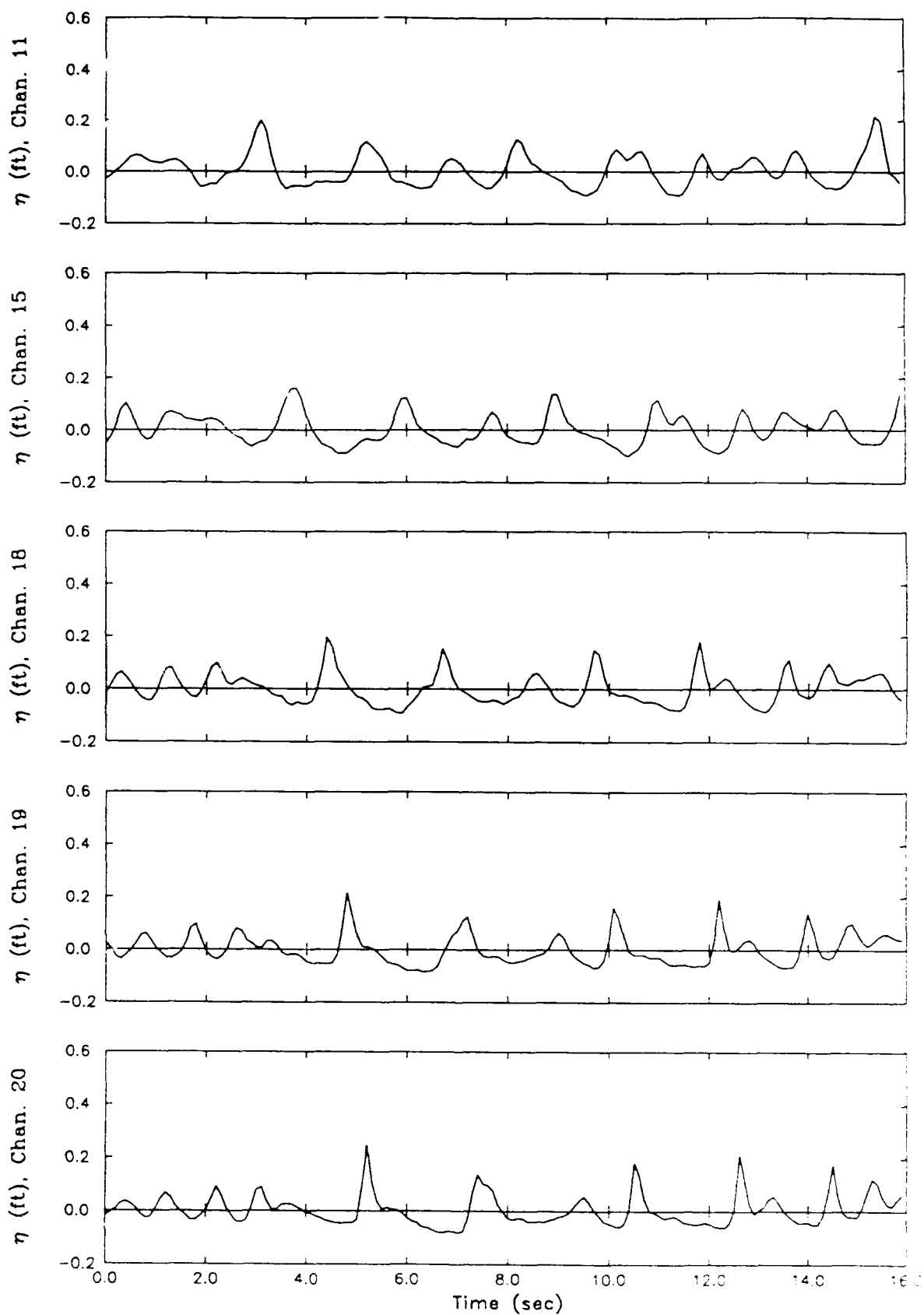
Generalized Beach Model, GBMD6802



Generalized Beach Model, GBMD6802

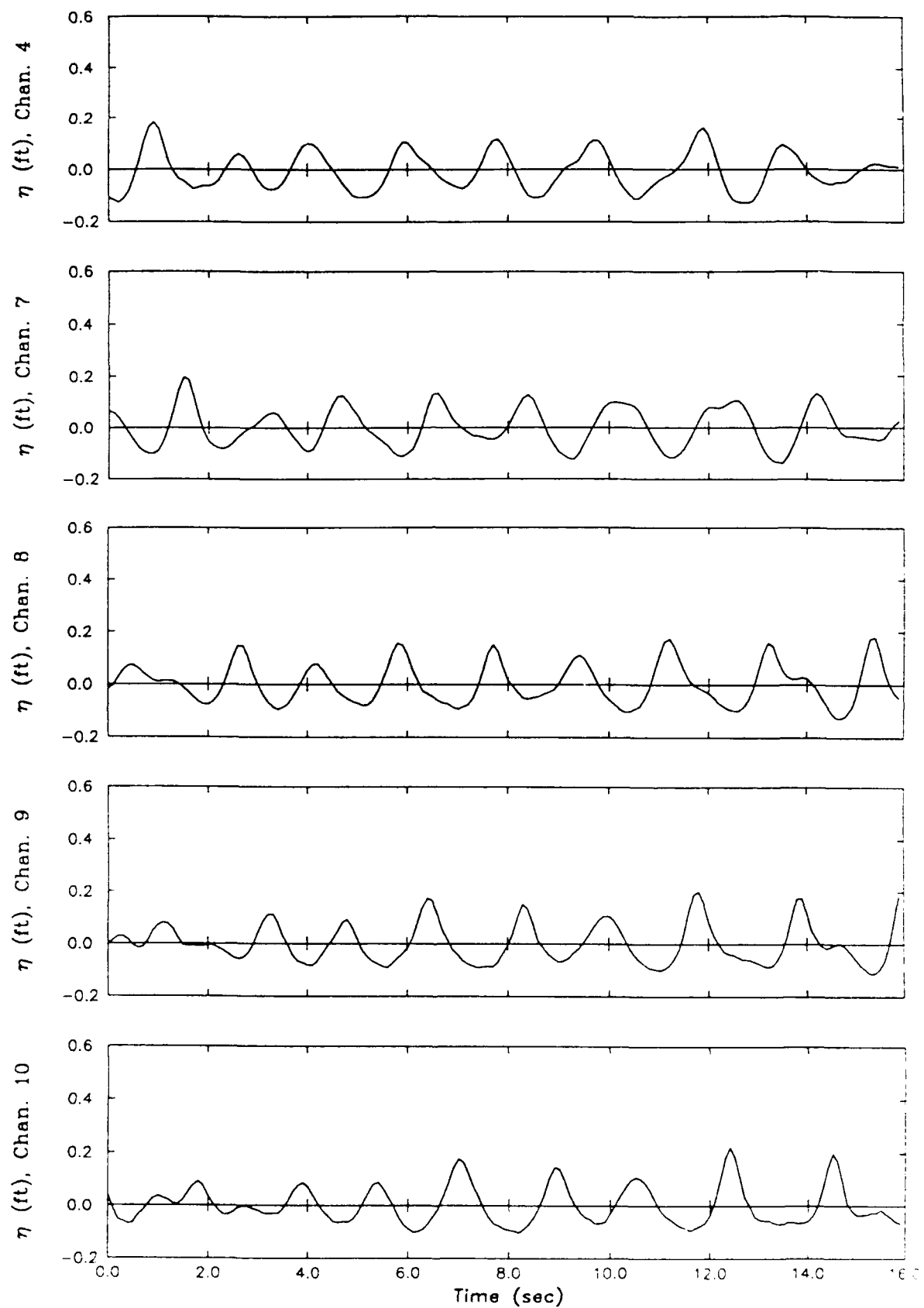


Generalized Beach Model, GBMD7101

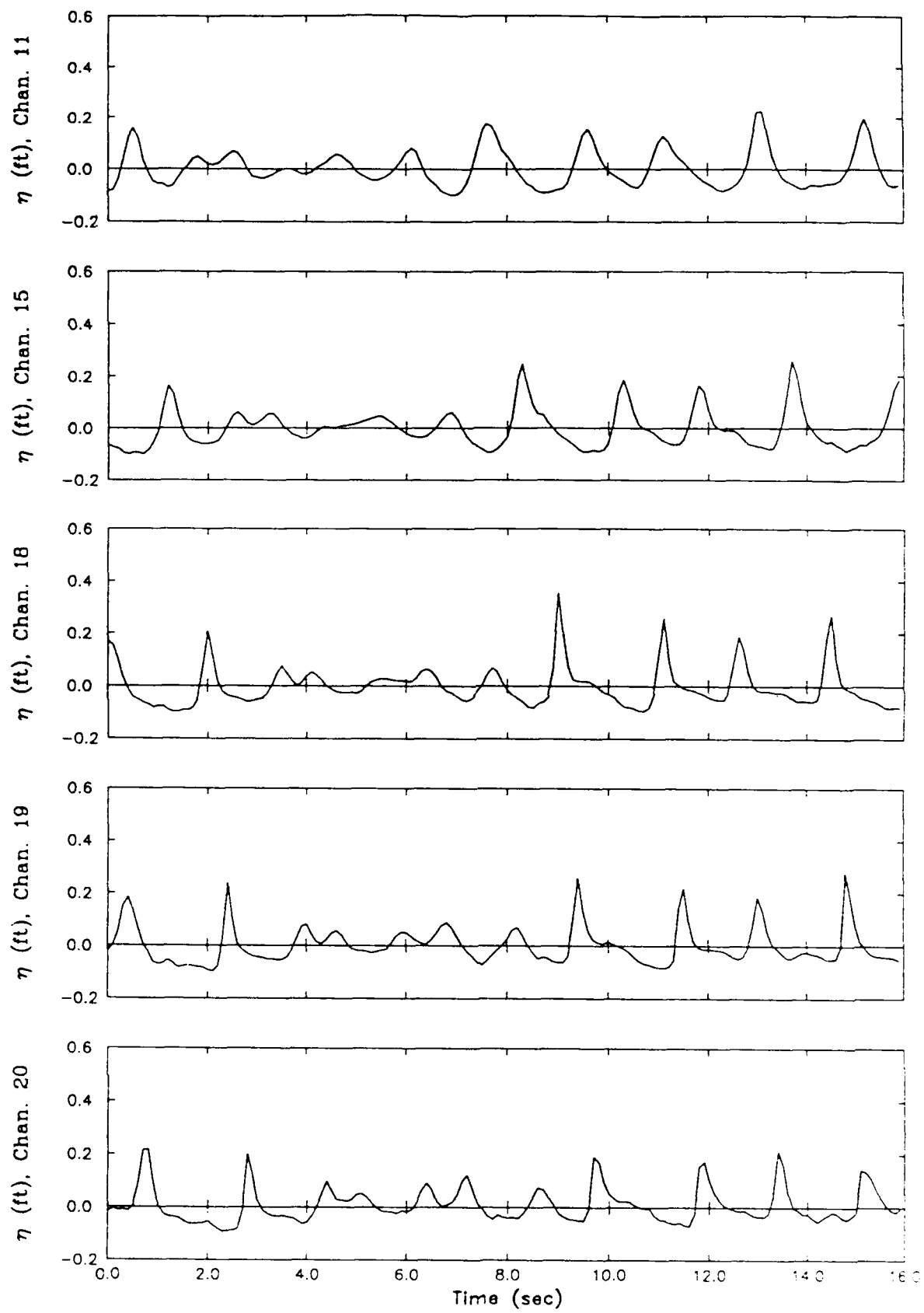


Generalized Beach Model, GBMD7101

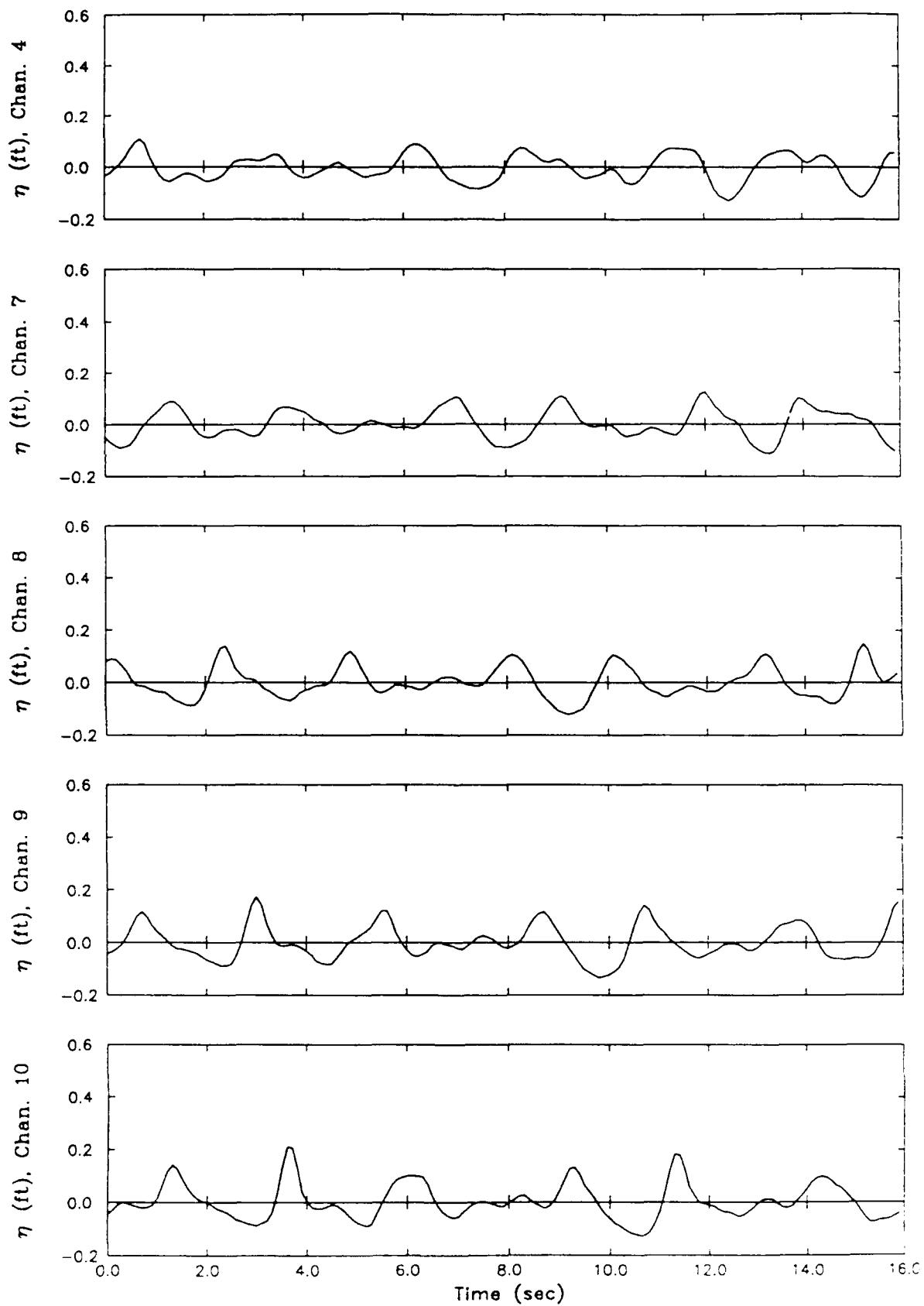




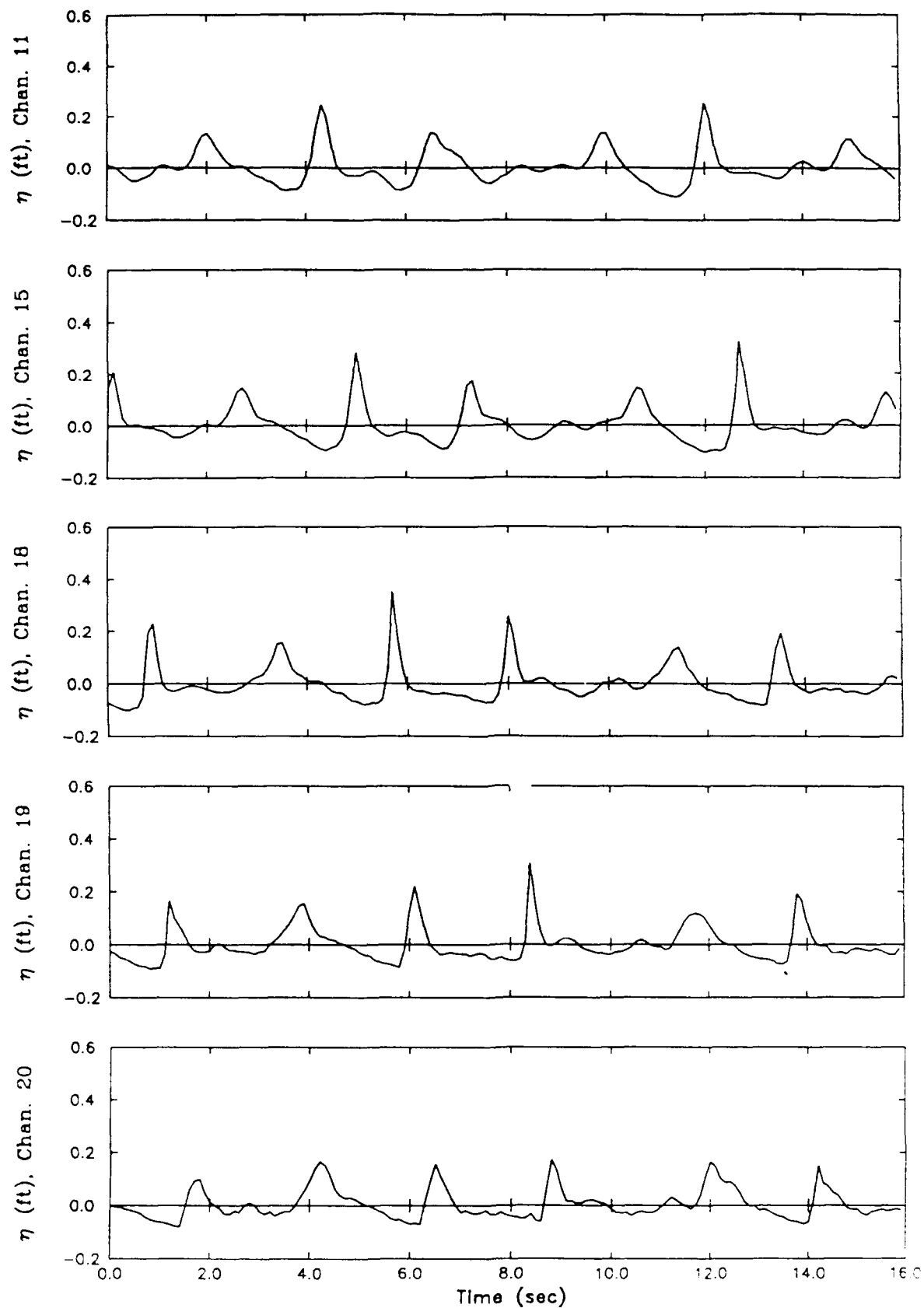
Generalized Beach Model, GBMD7201



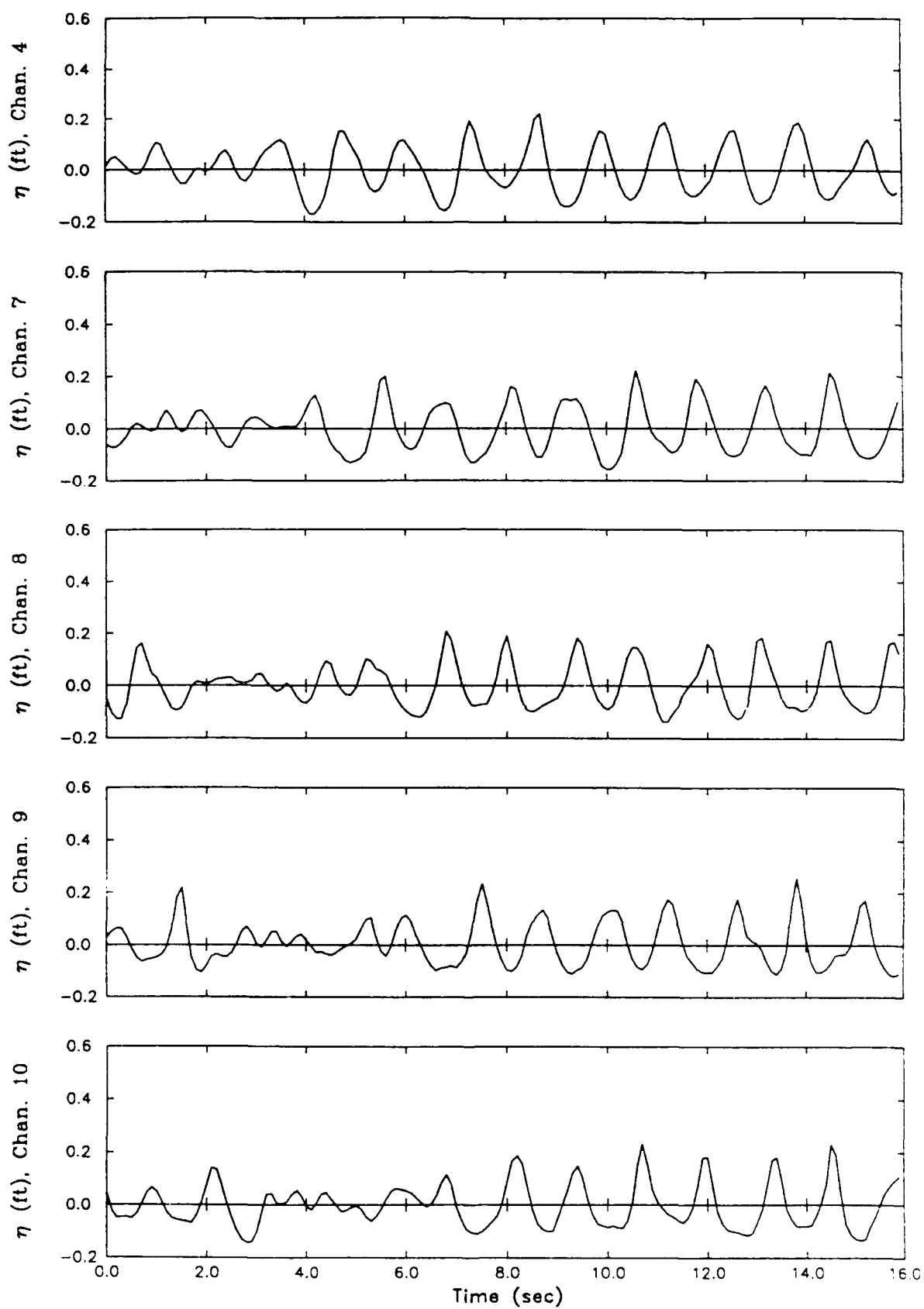
Generalized Beach Model, GBMD7201



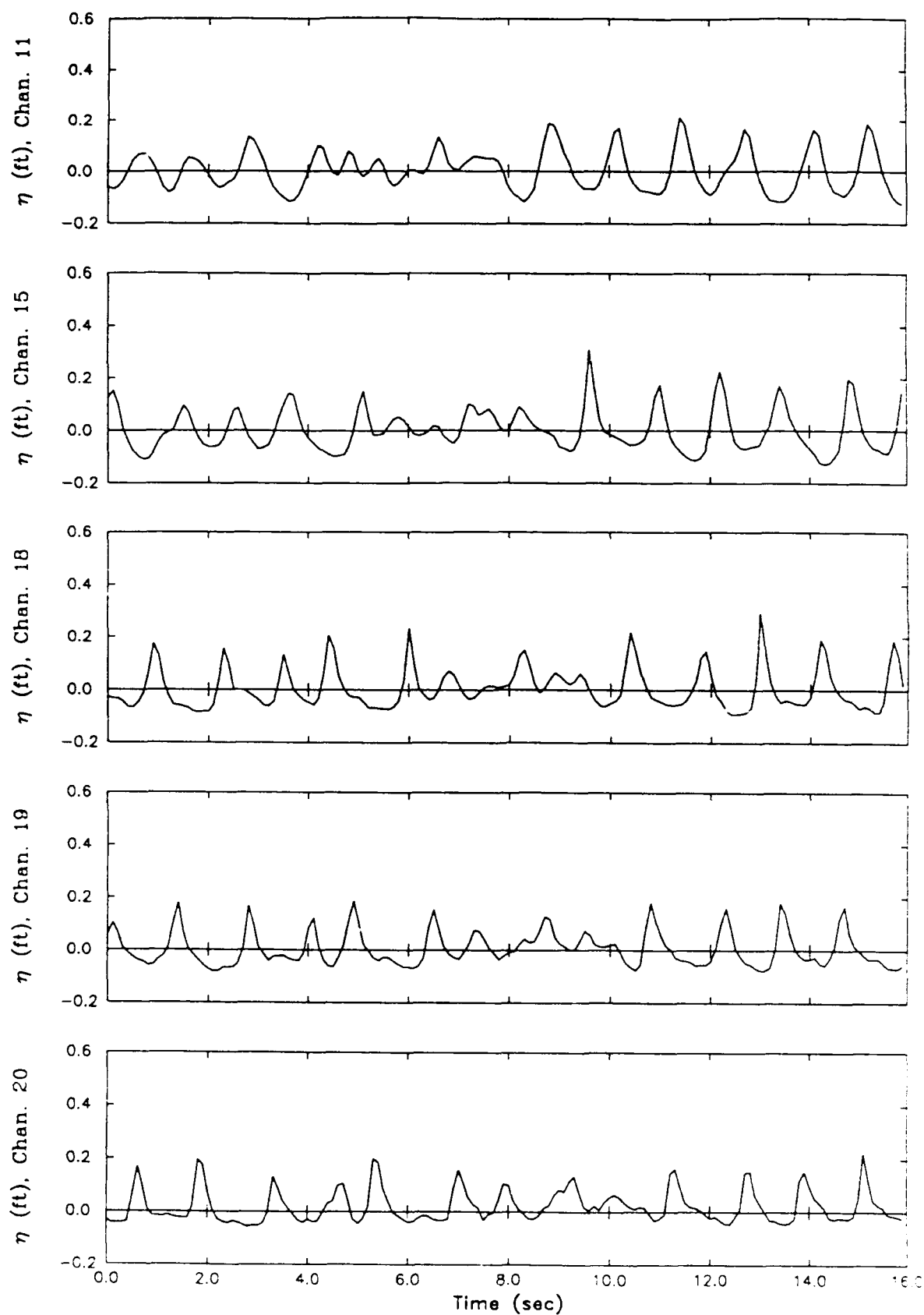
Generalized Beach Model, GBMD7301



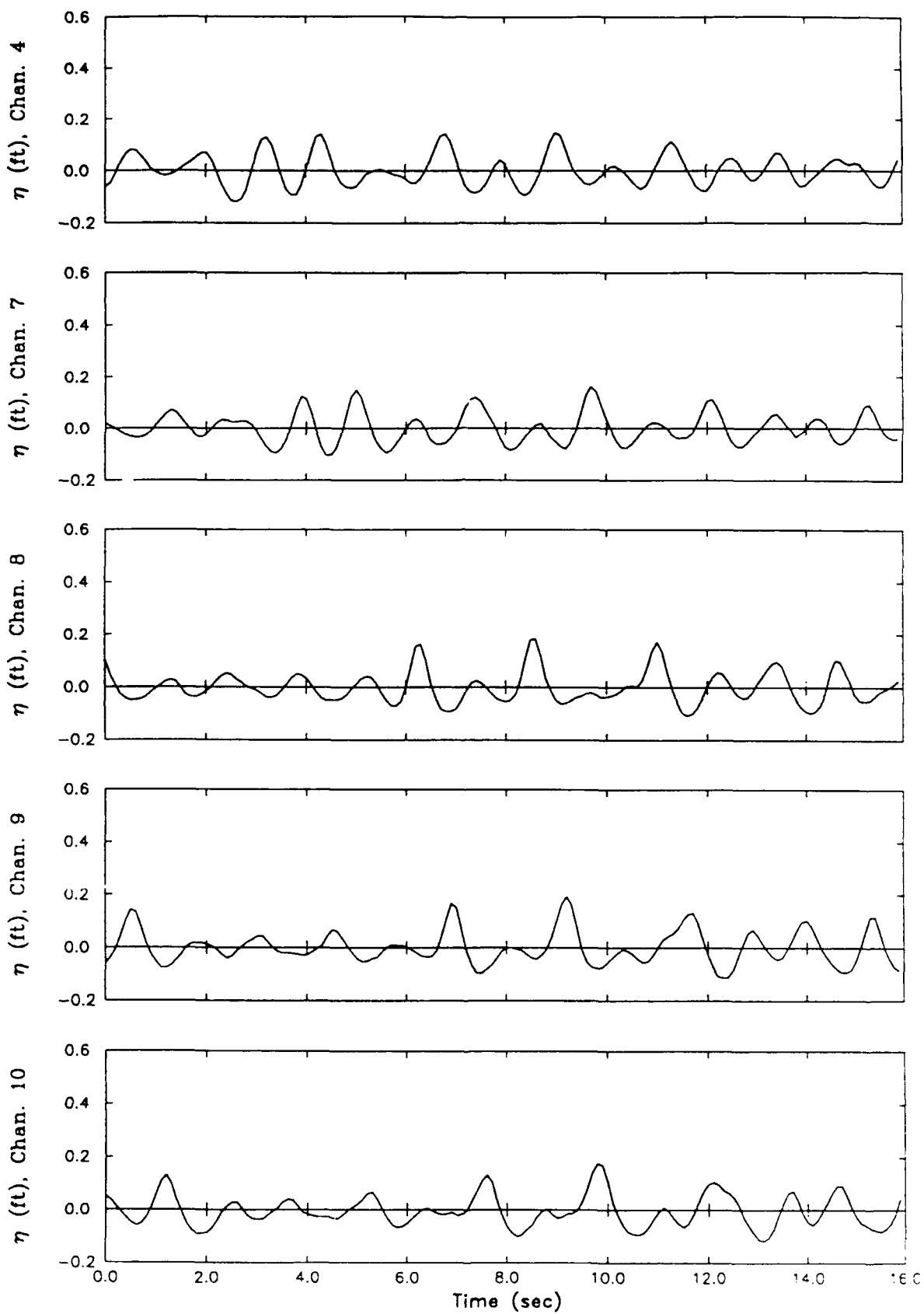
Generalized Beach Model, GBMD7301



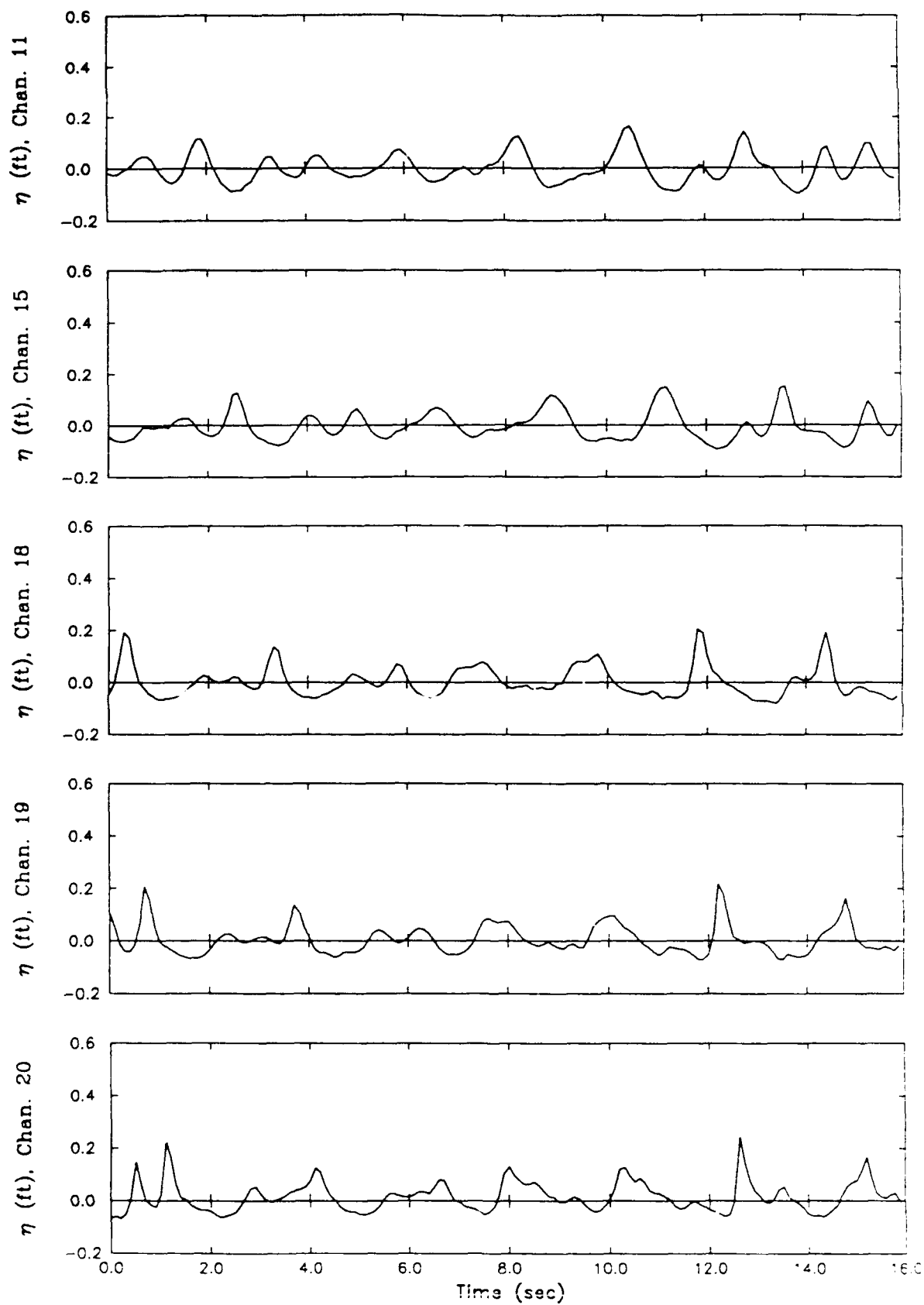
Generalized Beach Model, GBMD8101



Generalized Beach Model, GBMD8101

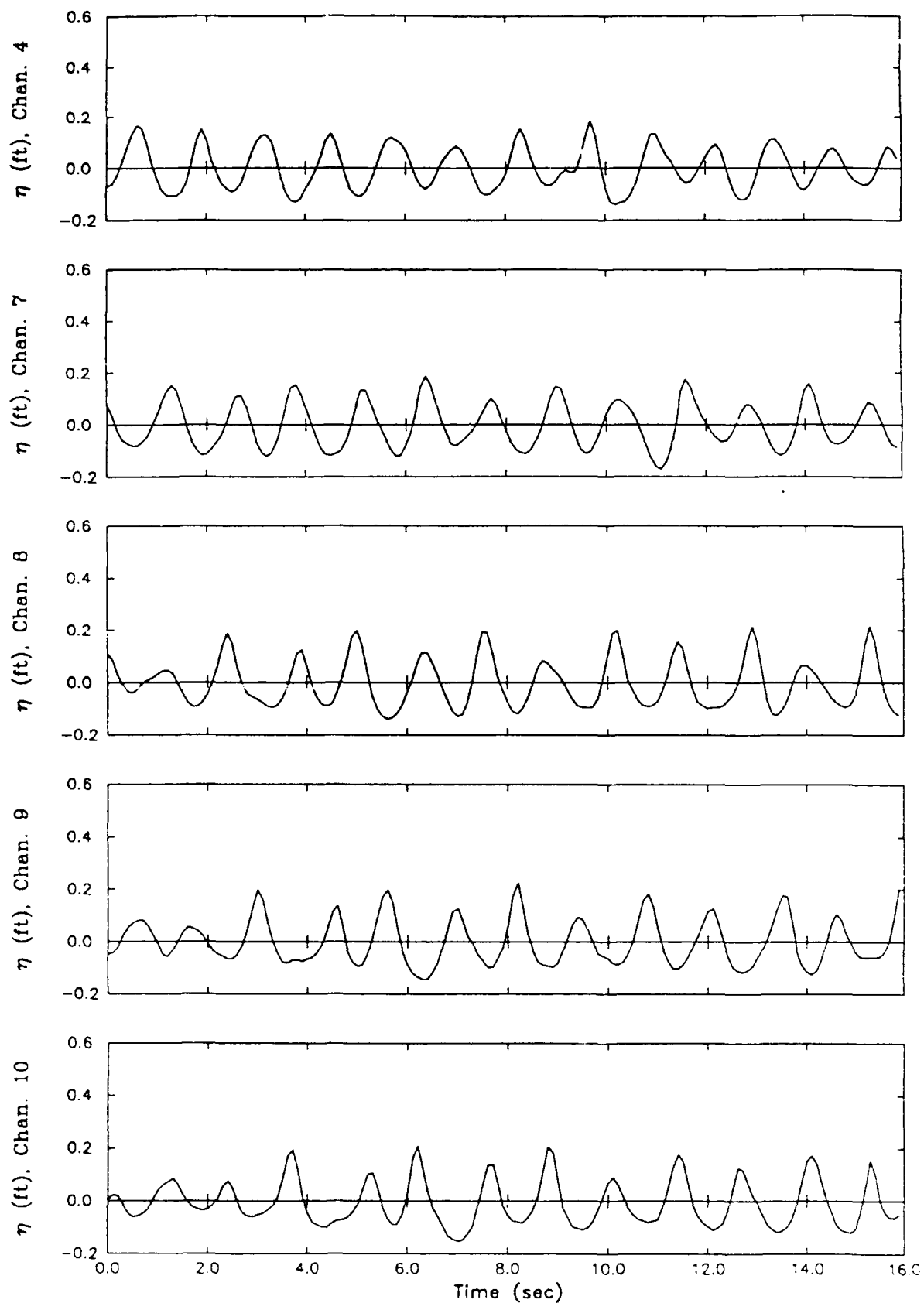


Generalized Beach Model, GBMD8201



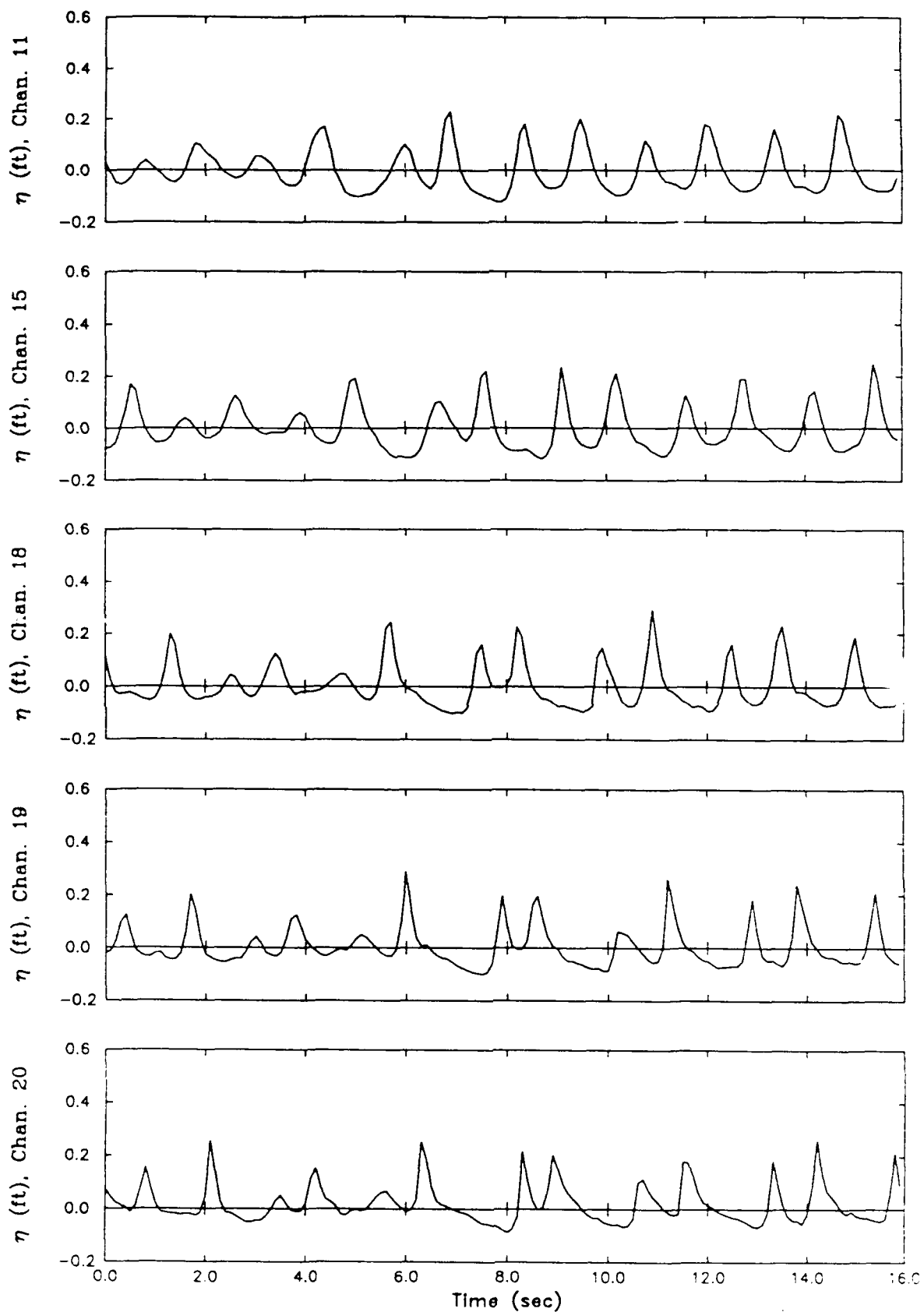
Generalized Beach Model, GBMD8201





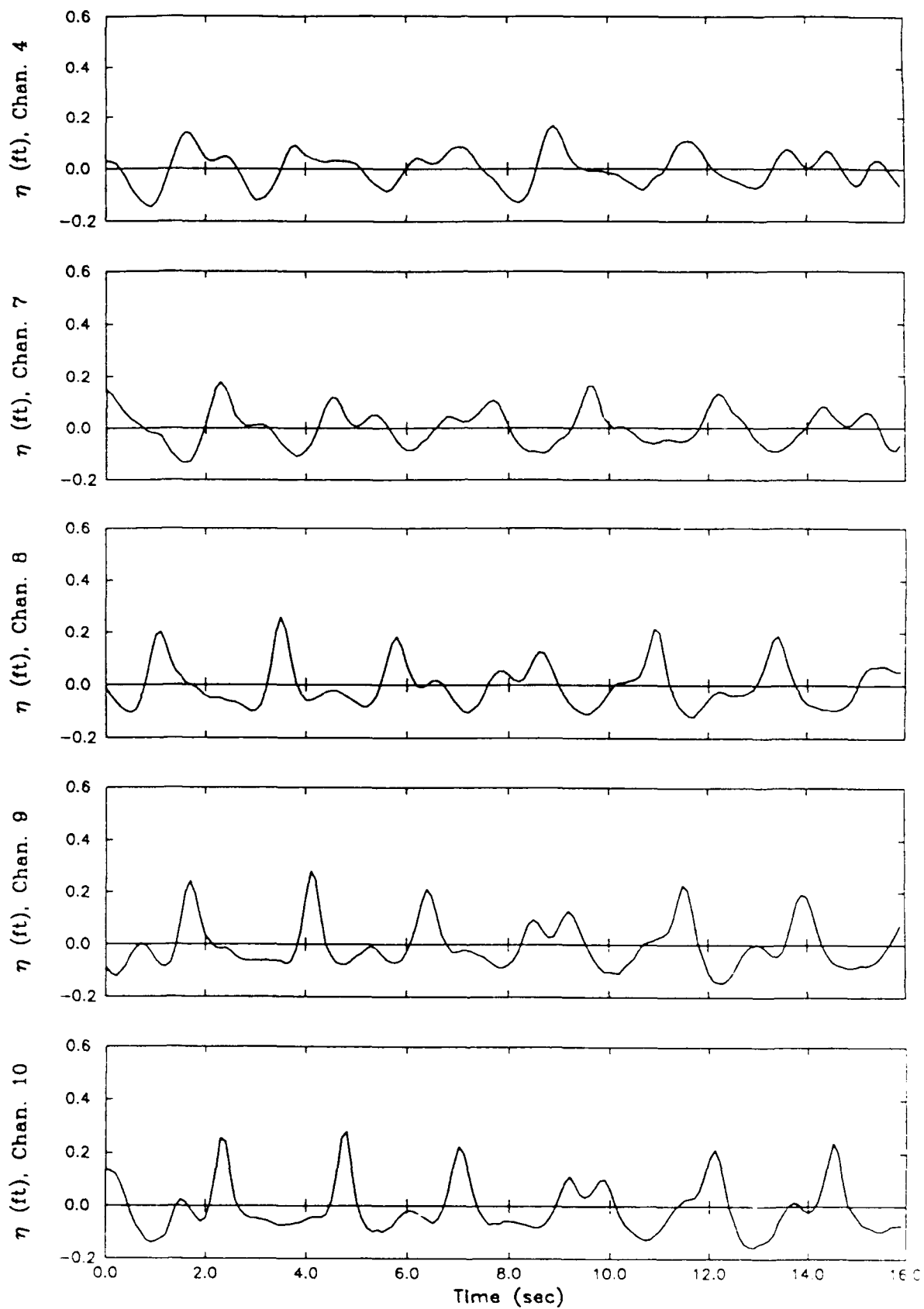
Generalized Beach Model, GBMD8301

D100



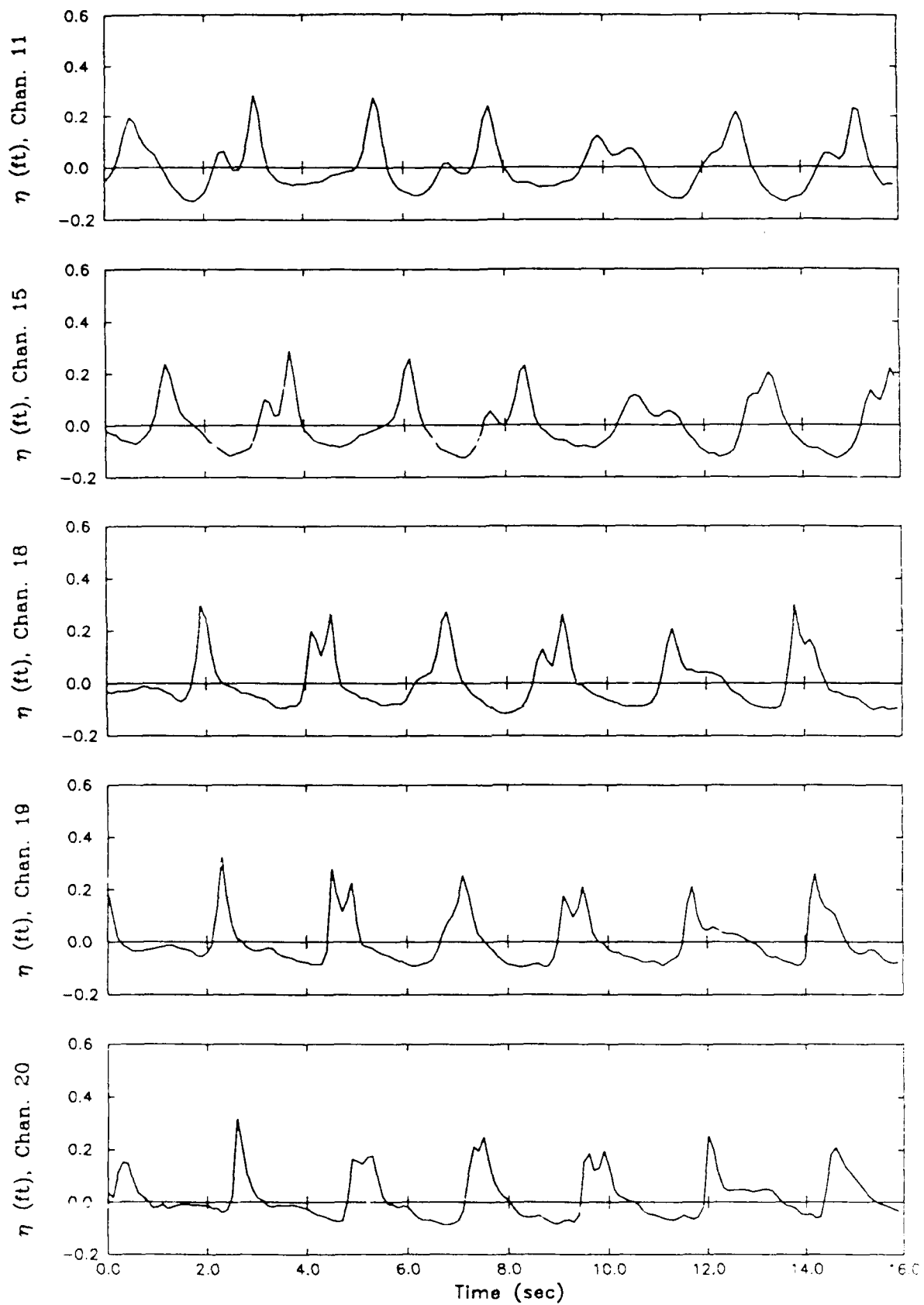
Generalized Beach Model, GBMD8301

D101

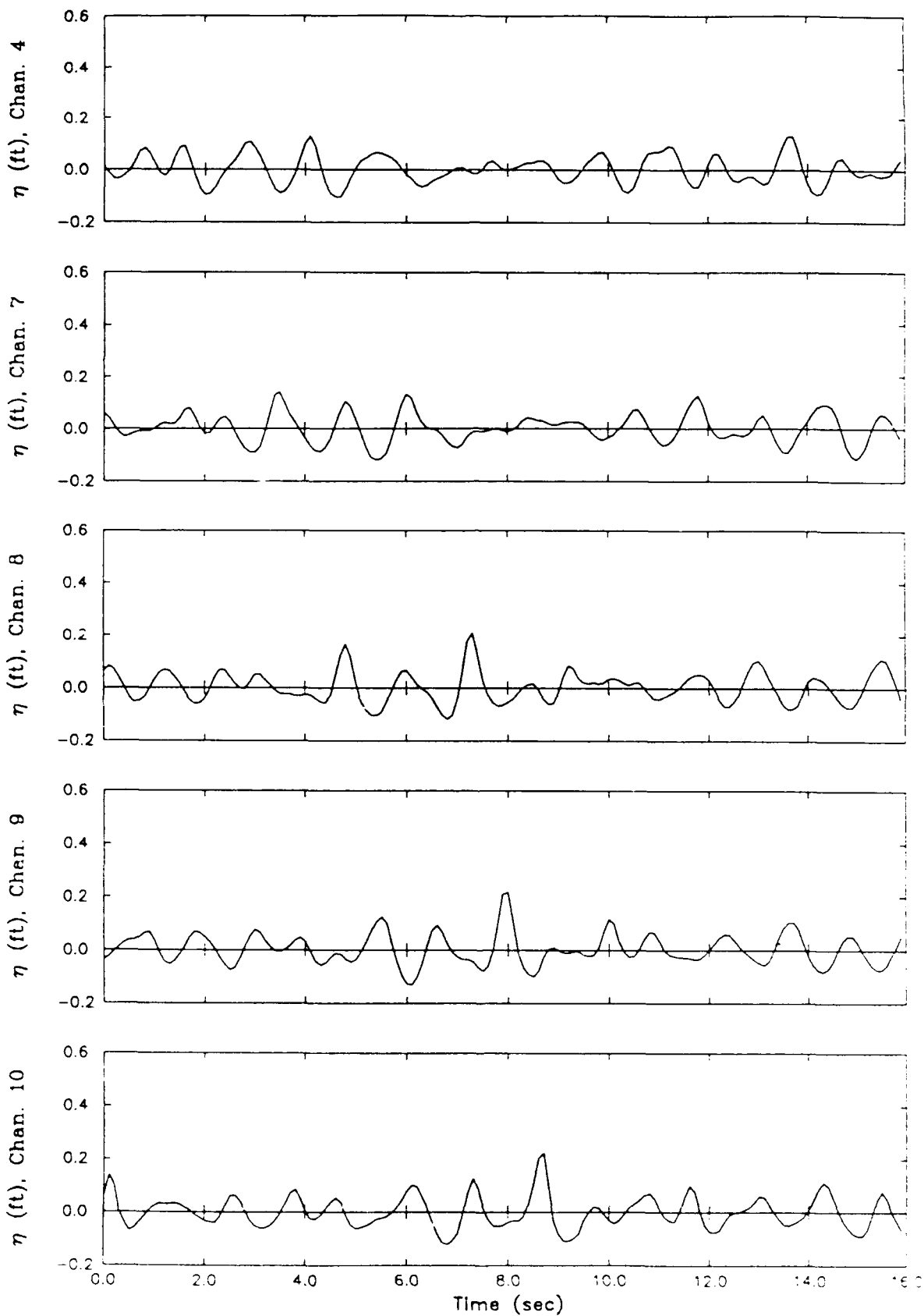


Generalized Beach Model, GBMD8401

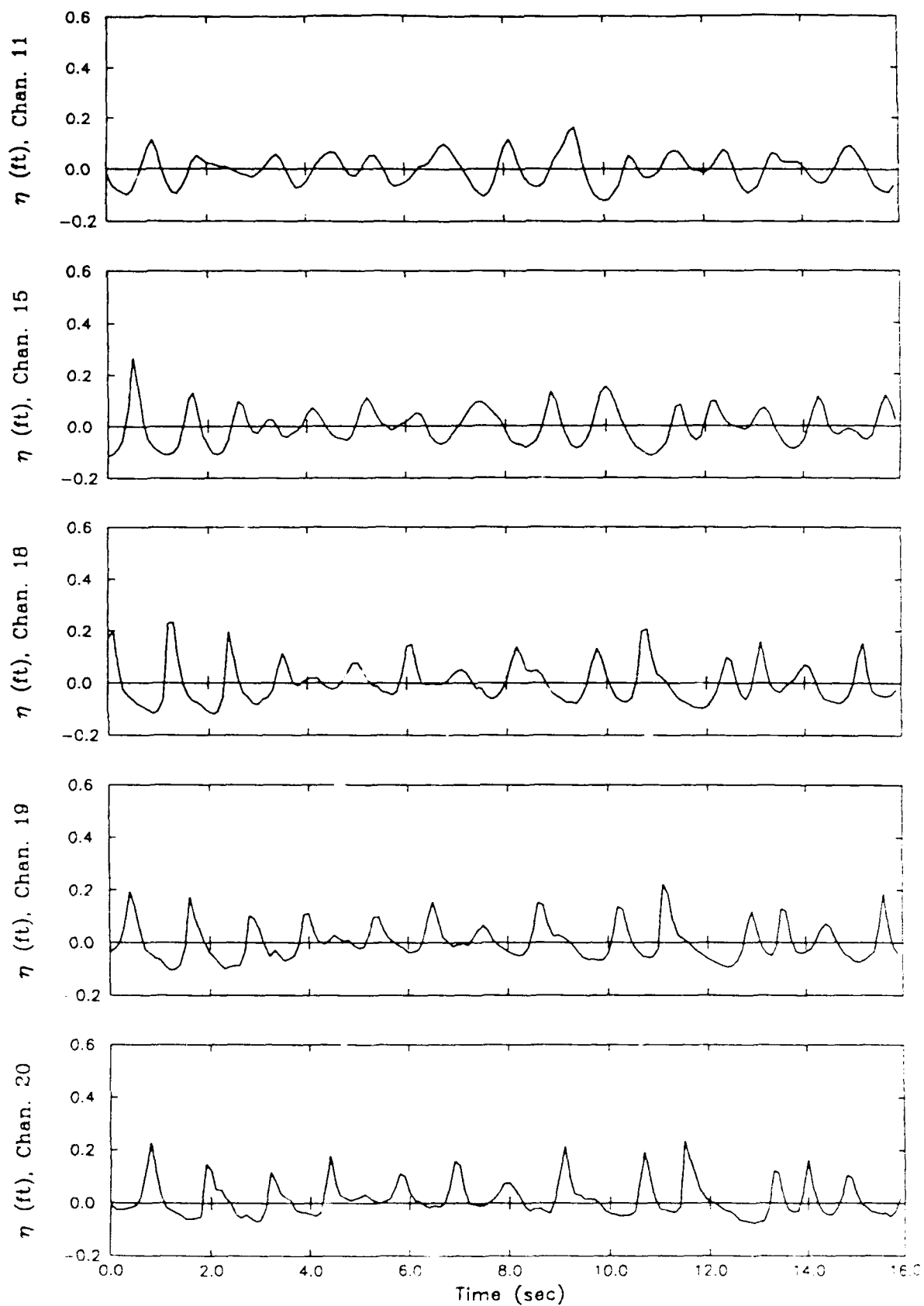
D102



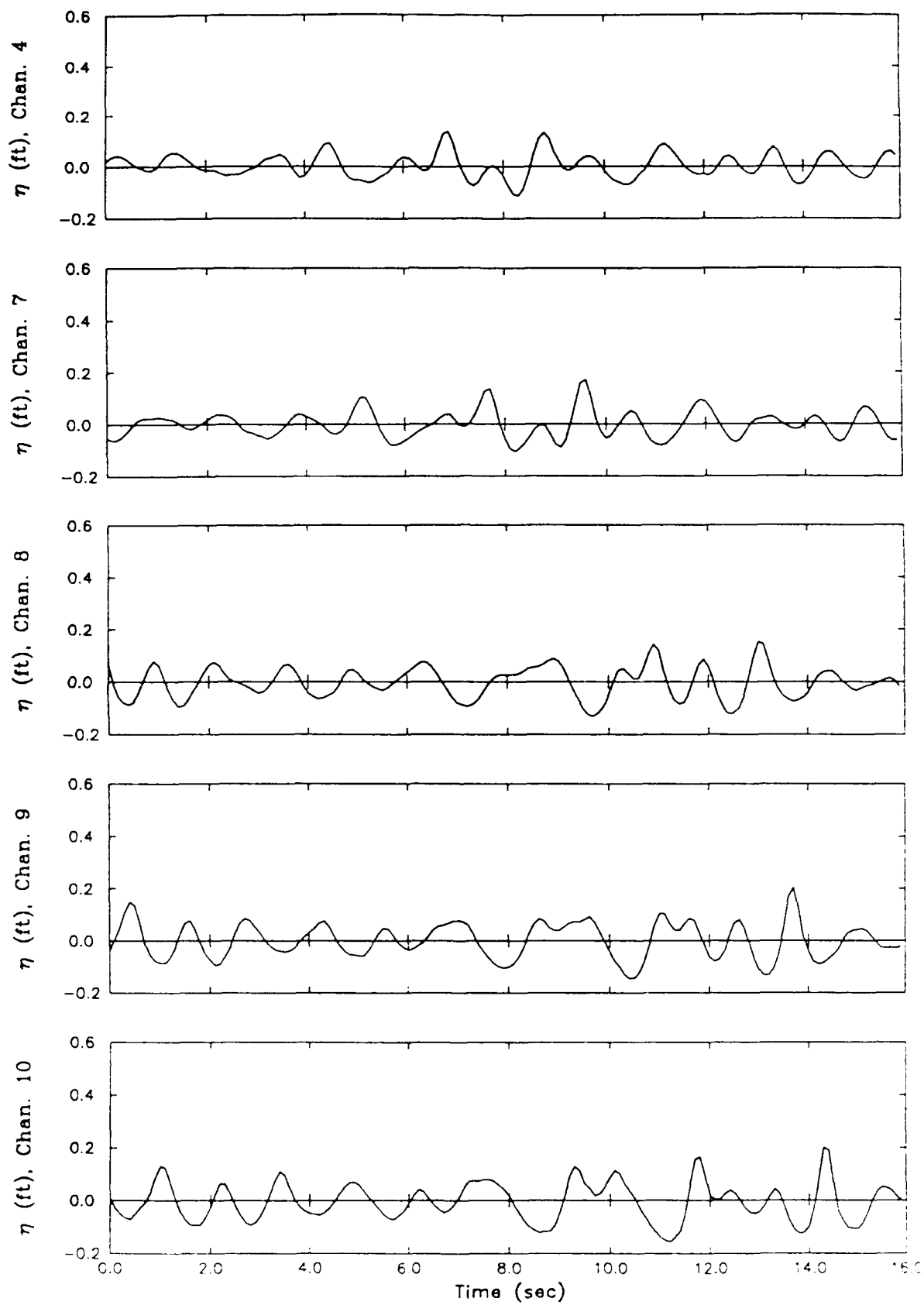
Generalized Beach Model, GBMD8401



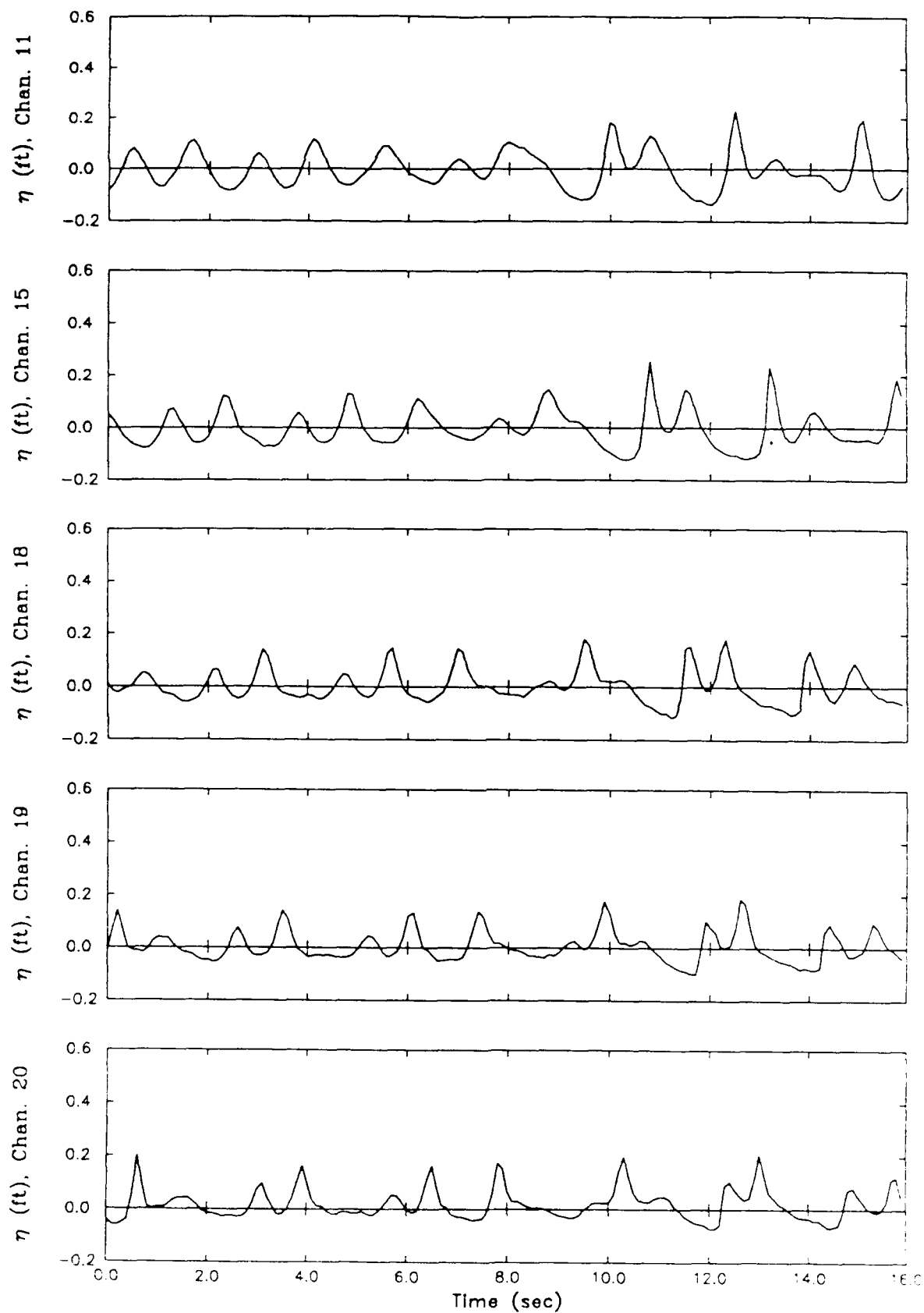
Generalized Beach Model, GBMD8501



Generalized Beach Model, GBMD8501

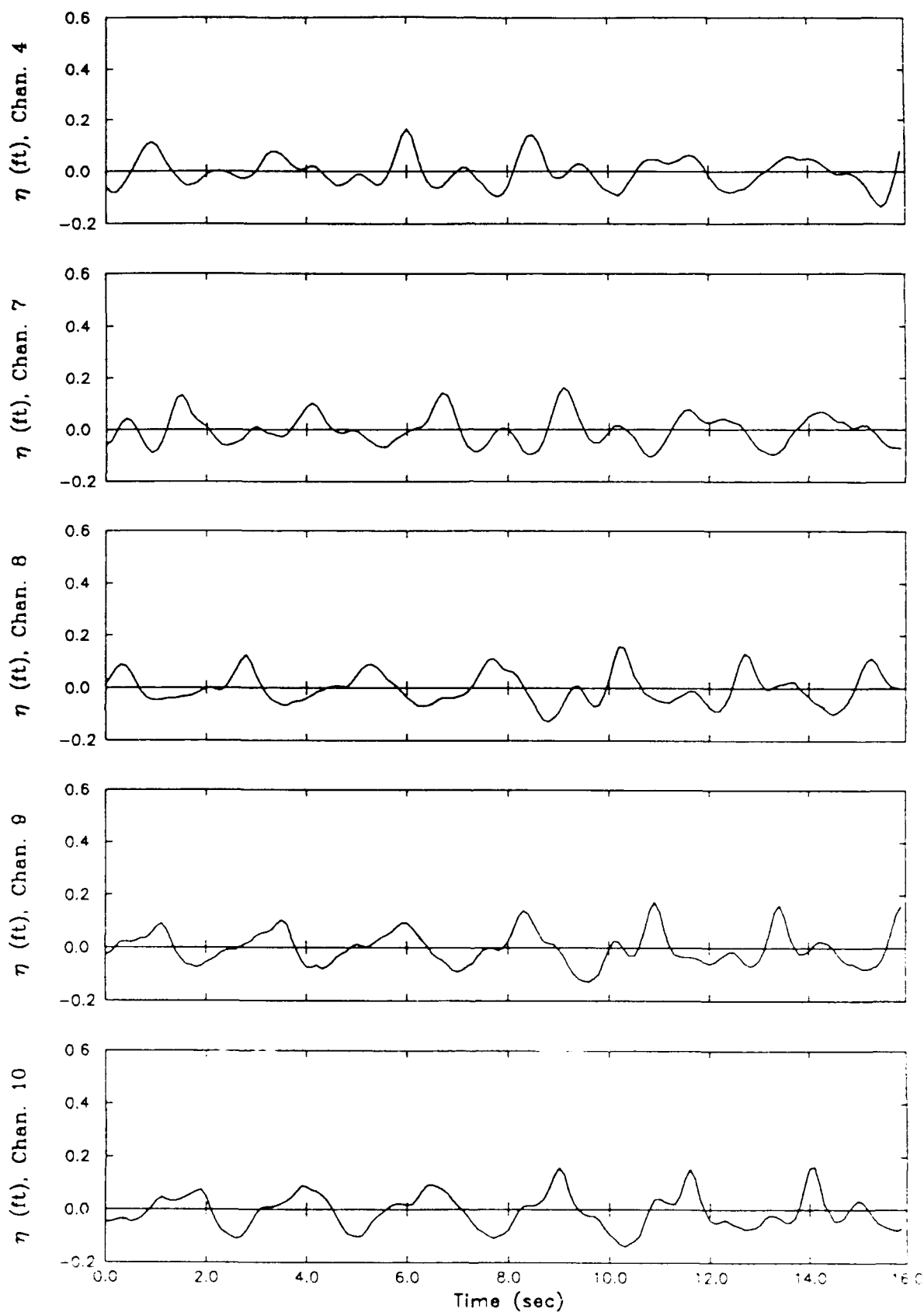


Generalized Beach Model, GBMD8601

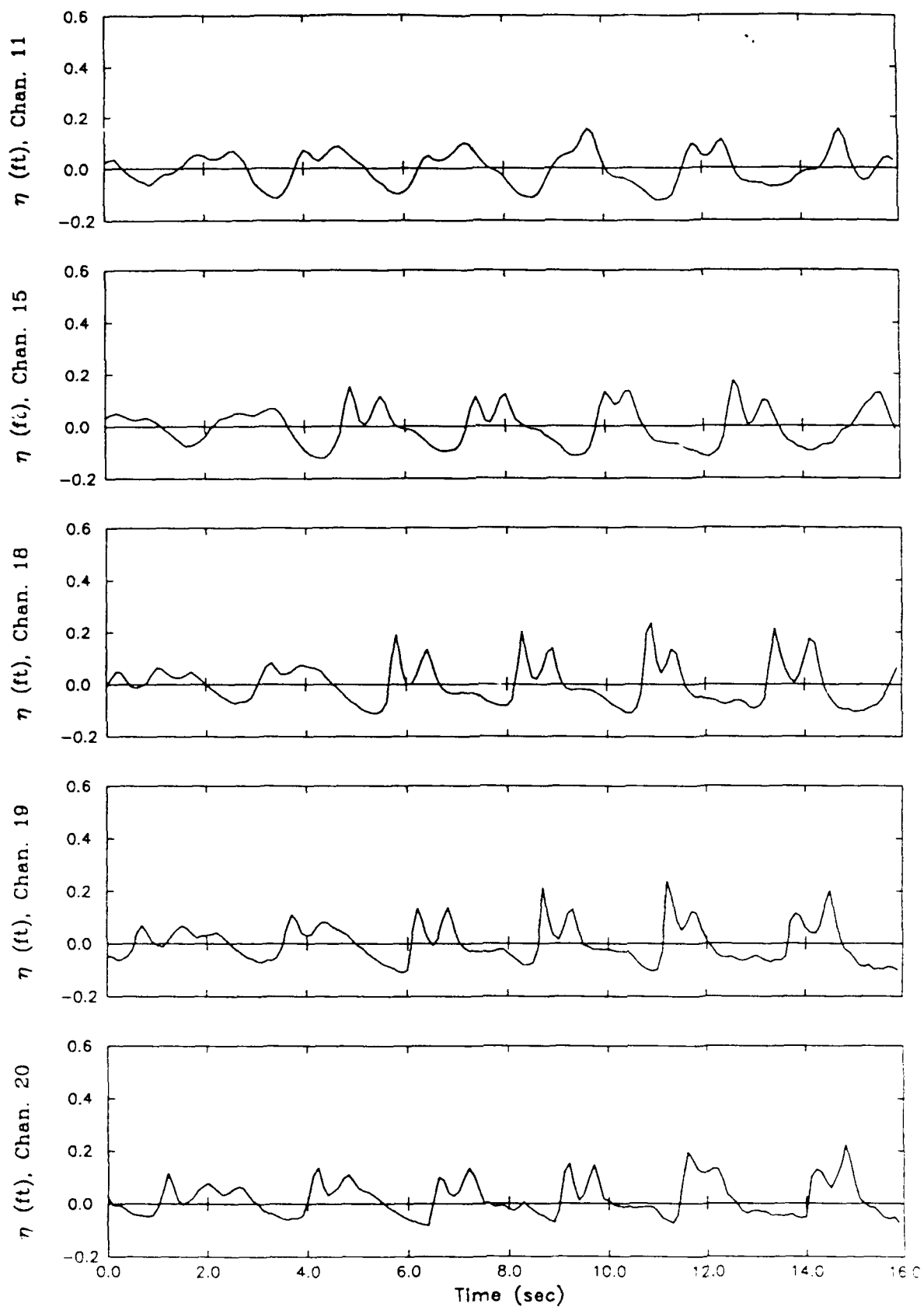


Generalized Beach Model, GBMD8601





Generalized Beach Model, GBMD8701



Generalized Beach Model, GBMD8701

## APPENDIX E: ZERO-DOWNCROSSING RESULTS

ETABAR, CM

E2

ELABAR, Cm  
Generalized Beach Model (GBM)

| Test Case | 1       | 2      | 3       | 4       | 5       | 6       | 7       | 8       | 9       | 10      | 11                  | 12     | 13     | 14     | 15      | 16     | 17      | 18     | 19     | 20     | Ave. 1-6 |
|-----------|---------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------------------|--------|--------|--------|---------|--------|---------|--------|--------|--------|----------|
|           |         |        |         |         |         |         |         |         |         |         | Gage Numbers        |        |        |        |         |        |         |        |        |        |          |
|           |         |        |         |         |         |         |         |         |         |         | Directional Series  |        |        |        |         |        |         |        |        |        |          |
| D51       | 0.1448  | 0.0497 | 0.0466  | 0.0253  | 0.0463  | -0.2771 | 0.0277  | -0.0155 | 0.0381  | -0.0043 | 0.0027              | 0.2771 | 0.2201 | 0.1628 | 0.1817  | 0.1615 | 0.2417  | 0.3740 | 0.4362 | 0.5529 | 0.0059   |
| D52       | 0.1085  | 0.0134 | 0.0390  | 0.0695  | -0.0174 | -0.2054 | -0.0223 | -0.0594 | -0.0241 | -0.0283 | -0.0244             | 0.1963 | 0.1417 | 0.1039 | 0.0917  | 0.0512 | 0.1695  | 0.2975 | 0.3469 | 0.4691 | 0.0013   |
| D53       | 0.1192  | 0.0948 | 0.0878  | 0.1533  | -0.0143 | -0.2344 | 0.0171  | 0.0088  | 0.0067  | -0.0070 | -0.0027             | 0.2374 | 0.1414 | 0.1024 | 0.0765  | 0.0668 | 0.1698  | 0.2755 | 0.3249 | 0.4526 | 0.0344   |
| D61       | 0.0168  | 0.1289 | 0.0610  | -0.0930 | 0.2377  | 0.1747  | 0.2082  | 0.1231  | 0.0640  | 0.1216  | 0.1369              | 0.2441 | 0.2067 | 0.2384 | 0.2063  | 0.3069 | 0.1914  | 0.4063 | 0.4660 | 0.6376 | 0.0674   |
| D62       | -0.0216 | 0.0165 | -0.1003 | -0.1658 | 0.2621  | 0.0674  | 0.1612  | 0.0177  | -0.0003 | 0.0280  | 0.1113              | 0.1335 | 0.1460 | 0.1490 | 0.1375  | 0.1780 | 0.0335  | 0.2673 | 0.3618 | 0.5517 | 0.0097   |
| D63       | 0.0067  | 0.0482 | -0.0713 | -0.1551 | 0.2463  | 0.1414  | 0.1387  | -0.0171 | -0.0253 | 0.0030  | 0.1317              | 0.1606 | 0.1628 | 0.1832 | 0.1646  | 0.2283 | 0.0052  | 0.3197 | 0.4200 | 0.6111 | 0.0360   |
| D64       | 0.0168  | 0.0744 | -0.1271 | -0.1853 | 0.2579  | 0.1106  | 0.1512  | -0.0335 | -0.0274 | 0.0475  | 0.1143              | 0.1643 | 0.1460 | 0.1716 | 0.1984  | 0.1859 | -0.0171 | 0.2801 | 0.3831 | 0.5569 | 0.0245   |
| D65       | -0.0027 | 0.0454 | -0.0808 | -0.1167 | 0.2533  | -0.0046 | 0.1088  | 0.0366  | -0.0058 | 0.0796  | 0.1170              | 0.1786 | 0.1923 | 0.1832 | 0.1430  | 0.2432 | 0.0802  | 0.2786 | 0.3566 | 0.5736 | 0.0156   |
| D66       | -0.0445 | 0.1859 | 0.0110  | -0.0189 | 0.2429  | 0.0561  | 0.1469  | 0.1049  | 0.0287  | 0.0917  | 0.1192              | 0.1899 | 0.1692 | 0.1378 | 0.0936  | 0.2262 | 0.0817  | 0.2338 | 0.2972 | 0.5340 | 0.0721   |
| D67       | -0.0792 | 0.0914 | -0.0326 | -0.0713 | 0.2164  | 0.0335  | 0.1408  | 0.0418  | 0.0424  | 0.0872  | 0.1018              | 0.1969 | 0.1469 | 0.1073 | 0.0924  | 0.2164 | 0.0363  | 0.2487 | 0.3319 | 0.5547 | 0.0284   |
| D68       | 0.2006  | 0.2393 | 0.0783  | 0.1140  | 0.1472  | -0.0058 | -0.0049 | 0.0128  | 0.0271  | -0.0774 | -0.0012             | 0.0738 | 0.1856 | 0.0677 | -0.0125 | 0.1814 | 0.0296  | 0.3078 | 0.3542 | 0.8492 | 0.1289   |
|           |         |        |         |         |         |         |         |         |         |         | Non-Breaking Series |        |        |        |         |        |         |        |        |        |          |
| D71       | -0.0320 | 0.0811 | -0.0290 | -0.1256 | 0.2060  | 0.0643  | 0.1713  | 0.1207  | 0.0917  | 0.1384  | 0.1161              | 0.0732 | 0.0399 | 0.0625 | 0.0893  | 0.1207 | -0.0006 | 0.0616 | 0.0744 | 0.2380 | 0.027    |
| D72       | 0.0277  | 0.1192 | -0.0034 | -0.1018 | 0.1823  | 0.1003  | 0.1649  | 0.1301  | 0.0966  | 0.1344  | 0.1061              | 0.0600 | 0.0363 | 0.0475 | 0.0692  | 0.0939 | -0.0174 | 0.0335 | 0.0640 | 0.1926 | 0.094    |
| D73       | 0.0155  | 0.0732 | 0.0064  | -0.0354 | 0.1719  | 0.0454  | 0.1686  | 0.0762  | 0.0287  | 0.1539  | 0.1109              | 0.0750 | 0.0506 | 0.0378 | 0.0311  | 0.0878 | -0.0037 | 0.0341 | 0.0576 | 0.1856 | 0.046    |
| D81       | 0.3764  | 0.2637 | 0.0719  | 0.1881  | 0.2195  | 0.0966  | 0.1085  | 0.0805  | 0.2112  | -0.0347 | 0.1637              | 0.1573 | 0.1640 | 0.1436 | 0.1271  | 0.1713 | 0.0234  | 0.1829 | 0.1981 | 0.6340 | 0.202    |
| D82       | 0.2661  | 0.1747 | 0.0354  | 0.0933  | 0.1740  | 0.0341  | 0.0689  | 0.0479  | 0.0826  | -0.0747 | 0.0076              | 0.0427 | 0.1030 | 0.0699 | -0.0201 | 0.1448 | -0.0360 | 0.1253 | 0.1503 | 0.5014 | 0.129    |
| D83       | 0.2755  | 0.1423 | 0.0268  | 0.1186  | 0.1878  | 0.0061  | 0.0640  | 0.0201  | 0.0704  | -0.1430 | 0.0082              | 0.0488 | 0.1039 | 0.0536 | -0.0152 | 0.1241 | -0.0043 | 0.1457 | 0.1612 | 0.5492 | 0.126    |
| D84       | 0.2783  | 0.1798 | 0.0253  | 0.1359  | 0.2094  | 0.0201  | 0.0908  | 0.0555  | 0.0939  | -0.1448 | 0.0335              | 0.0521 | 0.1109 | 0.0701 | 0.0143  | 0.1241 | -0.0143 | 0.1375 | 0.1216 | 0.4971 | 0.141    |
| D85       | 0.2615  | 0.2170 | 0.0451  | 0.1530  | 0.2036  | -0.0223 | 0.0838  | 0.0710  | 0.1018  | -0.0418 | -0.0165             | 0.0043 | 0.1015 | 0.0466 | -0.0262 | 0.1228 | -0.0241 | 0.1177 | 0.1375 | 0.5285 | 0.143    |
| D86       | 0.2271  | 0.2320 | 0.0899  | 0.1420  | 0.1786  | -0.0771 | 0.0308  | 0.0415  | 0.1161  | -0.0366 | -0.0030             | 0.0098 | 0.1052 | 0.0235 | -0.0421 | 0.1042 | -0.0143 | 0.0936 | 0.0945 | 0.4983 | 0.132    |
| D87       | 0.2374  | 0.1561 | 0.0552  | 0.0805  | 0.1929  | 0.0844  | 0.0204  | -0.0082 | 0.0454  | -0.0680 | 0.0067              | 0.0195 | 0.1082 | 0.0244 | -0.0594 | 0.0850 | -0.0364 | 0.0893 | 0.0899 | 0.5054 | 0.134    |

11/3, Sec  
Generalized Beach Model (GBM)

| Test Case                 | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12    | 13    | 14    | 15    | 16    | 17    | 18    | 19    | 20    | Ave.  |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                           |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Unimodal Series           |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| S01                       | 1.851 | 1.949 | 1.841 | 1.745 | 1.917 | 2.021 | 1.800 | 1.745 | 1.810 | 1.861 | 1.894 | 2.005 | 1.919 | 1.896 | 1.886 | 1.896 | 1.937 | 1.873 | 1.970 | 2.000 | 1.887 |
| S09                       | 1.935 | 1.893 | 1.949 | 1.901 | 1.935 | 1.907 | 1.885 | 1.902 | 1.861 | 1.878 | 1.860 | 1.892 | 1.876 | 1.865 | 1.937 | 1.947 | 1.973 | 1.928 | 1.885 | 1.924 | 1.920 |
| S13                       | 1.840 | 1.883 | 1.891 | 1.997 | 1.965 | 2.037 | 1.988 | 1.924 | 1.920 | 1.880 | 1.906 | 1.889 | 1.853 | 1.907 | 1.869 | 1.950 | 2.001 | 2.017 | 2.064 | 2.063 | 1.935 |
| S21                       | 1.858 | 1.902 | 1.815 | 1.960 | 1.941 | 2.017 | 1.959 | 1.885 | 1.876 | 1.901 | 1.886 | 1.859 | 1.863 | 1.940 | 1.892 | 1.828 | 1.964 | 1.883 | 1.894 | 1.886 | 1.916 |
| S25                       | 1.976 | 1.928 | 1.993 | 1.873 | 1.879 | 1.765 | 1.889 | 1.931 | 1.952 | 1.953 | 1.931 | 1.838 | 2.028 | 2.021 | 1.937 | 1.973 | 1.823 | 1.997 | 2.063 | 1.987 | 1.902 |
| S33                       | 1.887 | 1.924 | 1.900 | 1.940 | 1.958 | 2.004 | 1.911 | 1.901 | 1.853 | 1.849 | 1.816 | 1.911 | 1.850 | 1.892 | 1.905 | 1.923 | 1.976 | 1.882 | 1.907 | 1.886 | 1.935 |
| S37                       | 1.152 | 1.133 | 1.100 | 1.120 | 1.125 | 1.119 | 1.104 | 1.140 | 1.125 | 1.126 | 1.141 | 1.161 | 1.165 | 1.190 | 1.142 | 1.146 | 1.133 | 1.133 | 1.150 | 1.209 | 1.125 |
| S45                       | 1.129 | 1.119 | 1.138 | 1.128 | 1.130 | 1.138 | 1.124 | 1.160 | 1.174 | 1.175 | 1.180 | 1.168 | 1.174 | 1.187 | 1.200 | 1.162 | 1.173 | 1.181 | 1.175 | 1.167 | 1.130 |
| S49                       | 1.135 | 1.138 | 1.153 | 1.158 | 1.161 | 1.165 | 1.156 | 1.184 | 1.162 | 1.159 | 1.201 | 1.185 | 1.203 | 1.204 | 1.194 | 1.180 | 1.198 | 1.198 | 1.224 | 1.170 | 1.151 |
| S57                       | 1.127 | 1.158 | 1.118 | 1.131 | 1.136 | 1.130 | 1.143 | 1.161 | 1.170 | 1.156 | 1.175 | 1.148 | 1.164 | 1.167 | 1.185 | 1.183 | 1.169 | 1.195 | 1.199 | 1.192 | 1.133 |
| S61                       | 1.147 | 1.154 | 1.133 | 1.128 | 1.140 | 1.096 | 1.137 | 1.129 | 1.140 | 1.136 | 1.151 | 1.209 | 1.172 | 1.180 | 1.172 | 1.177 | 1.164 | 1.147 | 1.161 | 1.133 | 1.133 |
| S69                       | 1.145 | 1.132 | 1.108 | 1.136 | 1.144 | 1.156 | 1.142 | 1.161 | 1.163 | 1.179 | 1.171 | 1.162 | 1.199 | 1.189 | 1.165 | 1.162 | 1.151 | 1.188 | 1.157 | 1.188 | 1.138 |
| Mode Superposition Series |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| D01                       | 2.046 | 2.115 | 2.024 | 1.997 | 2.150 | 2.220 | 2.014 | 2.053 | 2.025 | 1.935 | 1.910 | 2.046 | 1.953 | 1.820 | 1.830 | 1.994 | 1.973 | 1.842 | 1.824 | 1.845 | 2.092 |
| D02                       | 1.670 | 1.665 | 1.682 | 1.637 | 1.647 | 1.667 | 1.570 | 1.606 | 1.599 | 1.614 | 1.637 | 1.626 | 1.610 | 1.582 | 1.639 | 1.654 | 1.610 | 1.605 | 1.645 | 1.659 | 1.661 |
| D03                       | 1.697 | 1.644 | 1.675 | 1.607 | 1.646 | 1.692 | 1.588 | 1.609 | 1.615 | 1.626 | 1.669 | 1.621 | 1.594 | 1.616 | 1.688 | 1.673 | 1.687 | 1.687 | 1.724 | 1.822 | 1.660 |
| D04                       | 2.093 | 2.070 | 2.003 | 1.930 | 2.051 | 2.203 | 1.950 | 1.999 | 2.016 | 2.008 | 2.002 | 2.144 | 2.028 | 1.902 | 2.024 | 2.058 | 2.043 | 2.015 | 2.018 | 2.005 | 2.058 |
| D05                       | 1.589 | 1.615 | 1.639 | 1.601 | 1.612 | 1.645 | 1.584 | 1.598 | 1.601 | 1.603 | 1.598 | 1.631 | 1.611 | 1.582 | 1.592 | 1.604 | 1.565 | 1.573 | 1.646 | 1.618 | 1.617 |
| D06                       | 1.743 | 1.730 | 1.741 | 1.676 | 1.746 | 1.826 | 1.701 | 1.667 | 1.734 | 1.729 | 1.714 | 1.772 | 1.681 | 1.680 | 1.758 | 1.777 | 1.708 | 1.757 | 1.744 | 1.800 | 1.744 |
| D07                       | 2.041 | 2.083 | 2.000 | 1.904 | 2.079 | 2.219 | 1.966 | 2.036 | 1.968 | 2.044 | 2.027 | 2.059 | 1.944 | 1.885 | 2.016 | 2.020 | 1.990 | 1.992 | 1.987 | 2.053 | 2.054 |
| D08                       | 1.614 | 1.600 | 1.640 | 1.625 | 1.607 | 1.679 | 1.588 | 1.596 | 1.586 | 1.605 | 1.594 | 1.614 | 1.622 | 1.596 | 1.600 | 1.623 | 1.565 | 1.588 | 1.602 | 1.639 | 1.628 |
| D09                       | 1.880 | 1.863 | 1.830 | 1.799 | 1.865 | 1.889 | 1.787 | 1.781 | 1.820 | 1.847 | 1.822 | 1.870 | 1.792 | 1.752 | 1.889 | 1.900 | 1.850 | 1.843 | 1.887 | 1.951 | 1.854 |
| Directional Series        |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| D13                       | 1.706 | 1.697 | 1.742 | 1.717 | 1.698 | 1.734 | 1.563 | 1.678 | 1.685 | 1.670 | 1.695 | 1.666 | 1.652 | 1.652 | 1.687 | 1.661 | 1.722 | 1.667 | 1.702 | 1.721 | 1.716 |
| D16                       | 1.859 | 1.831 | 1.843 | 1.789 | 1.813 | 1.827 | 1.702 | 1.732 | 1.724 | 1.767 | 1.762 | 1.797 | 1.752 | 1.787 | 1.743 | 1.764 | 1.839 | 1.746 | 1.834 | 1.765 | 1.827 |
| D19                       | 1.998 | 2.054 | 2.027 | 1.887 | 1.953 | 1.996 | 1.839 | 1.978 | 1.984 | 1.938 | 1.906 | 1.982 | 2.014 | 2.061 | 1.878 | 1.834 | 1.937 | 1.900 | 1.896 | 1.916 | 1.986 |
| D23                       | 1.676 | 1.684 | 1.717 | 1.723 | 1.737 | 1.744 | 1.645 | 1.690 | 1.687 | 1.683 | 1.687 | 1.640 | 1.668 | 1.687 | 1.693 | 1.677 | 1.704 | 1.610 | 1.647 | 1.687 | 1.714 |
| D26                       | 1.836 | 1.864 | 1.829 | 1.812 | 1.839 | 1.848 | 1.762 | 1.800 | 1.817 | 1.803 | 1.756 | 1.874 | 1.878 | 1.798 | 1.765 | 1.744 | 1.834 | 1.803 | 1.893 | 1.874 | 1.835 |
| D29                       | 1.946 | 2.016 | 1.980 | 1.981 | 2.051 | 2.011 | 1.945 | 2.002 | 2.049 | 2.005 | 1.998 | 1.947 | 1.879 | 1.961 | 1.899 | 1.956 | 1.988 | 1.901 | 1.886 | 1.920 | 1.997 |
| D33                       | 1.698 | 1.687 | 1.708 | 1.679 | 1.663 | 1.638 | 1.617 | 1.665 | 1.699 | 1.712 | 1.696 | 1.689 | 1.682 | 1.707 | 1.692 | 1.692 | 1.627 | 1.695 | 1.752 | 1.810 | 1.679 |
| D36                       | 1.772 | 1.794 | 1.811 | 1.748 | 1.753 | 1.688 | 1.737 | 1.802 | 1.812 | 1.819 | 1.771 | 1.782 | 1.840 | 1.888 | 1.828 | 1.784 | 1.777 | 1.790 | 1.794 | 1.814 | 1.758 |
| D39                       | 1.950 | 1.954 | 1.925 | 1.849 | 1.873 | 1.823 | 1.878 | 1.961 | 1.951 | 2.005 | 1.963 | 1.847 | 1.965 | 1.986 | 2.004 | 1.930 | 1.909 | 1.937 | 1.992 | 2.015 | 1.896 |
| D43                       | 1.723 | 1.725 | 1.722 | 1.711 | 1.715 | 1.707 | 1.680 | 1.687 | 1.693 | 1.672 | 1.669 | 1.674 | 1.685 | 1.631 | 1.686 | 1.678 | 1.684 | 1.666 | 1.668 | 1.621 | 1.717 |
| D46                       | 1.786 | 1.845 | 1.860 | 1.751 | 1.792 | 1.887 | 1.754 | 1.749 | 1.751 | 1.715 | 1.756 | 1.747 | 1.805 | 1.814 | 1.751 | 1.759 | 1.812 | 1.847 | 1.846 | 1.833 | 1.820 |
| D49                       | 1.915 | 2.032 | 1.943 | 1.982 | 2.023 | 2.027 | 1.978 | 1.942 | 1.896 | 1.901 | 1.877 | 1.882 | 1.855 | 1.834 | 1.866 | 1.893 | 1.910 | 1.885 | 1.851 | 1.885 | 1.987 |

| Test Case | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | Ave. |
|-----------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|------|
| Test Case | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 1-6  |

[illegible]

H1/3, Cir  
Generalized Beach Model (GBM)

| Test Case                 | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12    | 13    | 14    | 15    | 16    | 17    | 18    | 19   | 20   | Ave. 1-6 |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|----------|
| Unimodal Series           |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |      |      |          |
| S01                       | 14.65 | 13.55 | 12.20 | 14.22 | 14.13 | 14.83 | 14.30 | 14.28 | 14.36 | 14.40 | 13.50 | 12.50 | 13.14 | 12.36 | 12.03 | 12.99 | 12.80 | 10.53 | 9.31 | 8.44 | 13.93    |
| S09                       | 13.15 | 13.68 | 13.51 | 14.19 | 14.00 | 12.78 | 13.88 | 14.38 | 14.66 | 15.38 | 14.18 | 12.49 | 12.32 | 11.69 | 12.41 | 13.57 | 12.71 | 11.41 | 9.43 | 8.44 | 13.55    |
| S13                       | 15.95 | 11.76 | 14.22 | 12.25 | 11.93 | 14.32 | 12.58 | 12.70 | 13.44 | 14.28 | 13.89 | 12.80 | 11.66 | 11.66 | 12.65 | 13.53 | 12.65 | 10.82 | 9.20 | 8.54 | 13.41    |
| S21                       | 12.53 | 13.71 | 13.24 | 13.51 | 13.54 | 13.76 | 13.71 | 14.14 | 14.62 | 15.63 | 13.74 | 11.77 | 12.63 | 12.46 | 12.16 | 13.00 | 13.06 | 10.71 | 9.25 | 8.11 | 13.38    |
| S25                       | 14.63 | 13.46 | 12.34 | 12.89 | 13.41 | 12.44 | 13.41 | 14.00 | 14.57 | 14.71 | 13.52 | 11.52 | 12.76 | 12.07 | 12.09 | 13.15 | 11.87 | 10.66 | 8.65 | 7.83 | 13.19    |
| S33                       | 12.99 | 13.25 | 14.01 | 12.88 | 12.74 | 13.37 | 13.25 | 13.81 | 14.14 | 14.59 | 13.36 | 12.71 | 12.44 | 12.28 | 12.42 | 13.33 | 13.00 | 10.96 | 9.24 | 8.36 | 13.21    |
| S37                       | 11.77 | 11.43 | 10.92 | 12.67 | 11.35 | 10.59 | 11.84 | 11.10 | 10.88 | 10.30 | 9.65  | 9.60  | 10.17 | 10.10 | 10.06 | 10.54 | 10.10 | 8.99  | 7.94 | 7.24 | 11.46    |
| S45                       | 10.43 | 11.96 | 12.44 | 11.95 | 11.20 | 10.98 | 11.45 | 11.09 | 11.02 | 11.28 | 10.92 | 9.06  | 10.17 | 10.10 | 9.76  | 9.69  | 9.69  | 9.03  | 7.71 | 6.91 | 11.49    |
| S49                       | 11.92 | 11.60 | 11.95 | 10.91 | 11.59 | 11.38 | 11.14 | 11.54 | 11.59 | 11.65 | 10.36 | 9.43  | 10.03 | 9.33  | 9.66  | 10.12 | 9.61  | 8.64  | 7.41 | 6.74 | 11.53    |
| S57                       | 10.74 | 12.08 | 11.08 | 11.68 | 11.99 | 11.38 | 11.83 | 11.63 | 11.27 | 11.35 | 10.68 | 9.50  | 9.95  | 10.30 | 10.04 | 10.79 | 9.85  | 8.89  | 7.56 | 6.93 | 11.49    |
| S61                       | 10.75 | 11.30 | 10.37 | 12.28 | 12.35 | 11.59 | 12.17 | 10.94 | 10.67 | 10.54 | 9.81  | 9.07  | 9.94  | 8.88  | 9.40  | 9.52  | 9.12  | 8.22  | 7.14 | 6.66 | 11.44    |
| S69                       | 11.68 | 10.61 | 11.62 | 12.00 | 10.82 | 11.27 | 12.03 | 11.60 | 11.32 | 11.31 | 10.80 | 9.35  | 10.21 | 9.66  | 10.13 | 10.63 | 10.17 | 9.20  | 7.60 | 6.83 | 11.33    |
| Mode Superposition Series |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |      |      |          |
| D01                       | 7.78  | 6.61  | 6.78  | 7.15  | 7.04  | 8.18  | 7.48  | 7.70  | 7.99  | 8.36  | 8.45  | 9.08  | 8.27  | 8.26  | 8.52  | 9.40  | 9.19  | 9.10  | 8.08 | 7.62 | 7.26     |
| D02                       | 14.60 | 12.19 | 12.82 | 13.62 | 12.48 | 12.63 | 13.10 | 12.60 | 12.97 | 13.42 | 12.71 | 12.24 | 12.05 | 10.97 | 12.12 | 13.64 | 11.87 | 10.81 | 8.86 | 7.70 | 13.06    |
| D03                       | 14.69 | 12.70 | 13.07 | 14.12 | 13.37 | 14.35 | 13.55 | 13.11 | 13.60 | 13.71 | 12.92 | 11.64 | 11.63 | 10.94 | 11.60 | 12.82 | 11.78 | 10.46 | 8.91 | 7.91 | 13.72    |
| D04                       | 11.56 | 9.66  | 9.62  | 10.49 | 10.14 | 11.18 | 10.98 | 11.43 | 11.80 | 12.24 | 11.98 | 12.33 | 11.73 | 11.11 | 11.34 | 12.53 | 12.05 | 10.57 | 8.86 | 8.03 | 10.44    |
| D05                       | 10.89 | 9.14  | 10.07 | 10.58 | 10.06 | 10.49 | 10.27 | 10.12 | 10.41 | 11.02 | 10.76 | 10.90 | 10.50 | 10.11 | 11.61 | 11.65 | 10.78 | 9.82  | 8.66 | 7.76 | 10.20    |
| D06                       | 14.29 | 11.94 | 12.24 | 13.63 | 12.76 | 13.67 | 13.23 | 13.06 | 13.22 | 13.79 | 12.85 | 11.78 | 11.11 | 11.13 | 12.16 | 13.02 | 11.91 | 10.66 | 9.06 | 7.95 | 13.09    |
| D07                       | 12.98 | 11.18 | 11.07 | 11.46 | 11.74 | 12.26 | 12.29 | 12.50 | 13.06 | 13.62 | 12.40 | 12.23 | 12.13 | 11.42 | 11.60 | 12.74 | 11.95 | 10.45 | 8.89 | 7.93 | 11.86    |
| D08                       | 7.63  | 6.50  | 7.30  | 7.49  | 7.09  | 7.54  | 7.18  | 7.05  | 7.30  | 7.90  | 7.89  | 8.52  | 7.76  | 7.82  | 8.34  | 9.04  | 8.25  | 8.68  | 7.98 | 7.73 | 7.26     |
| D09                       | 13.23 | 10.93 | 11.34 | 12.35 | 11.89 | 12.78 | 12.38 | 12.33 | 13.06 | 13.49 | 12.50 | 12.01 | 10.89 | 11.19 | 11.80 | 13.02 | 11.79 | 10.48 | 9.16 | 8.08 | 12.09    |
| Directional Series        |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |      |      |          |
| D13                       | 13.78 | 14.21 | 13.54 | 15.25 | 14.76 | 14.08 | 15.72 | 15.89 | 16.29 | 16.09 | 14.56 | 12.15 | 12.28 | 12.37 | 12.37 | 13.41 | 13.26 | 10.68 | 8.84 | 8.05 | 14.27    |
| D16                       | 13.70 | 13.62 | 12.94 | 14.64 | 14.90 | 13.60 | 14.86 | 15.35 | 15.64 | 15.65 | 14.24 | 12.49 | 11.94 | 12.21 | 12.48 | 13.67 | 13.18 | 10.88 | 9.25 | 7.85 | 13.90    |
| D19                       | 13.39 | 12.61 | 12.35 | 13.52 | 13.27 | 12.63 | 14.05 | 14.56 | 14.94 | 15.11 | 14.15 | 12.68 | 12.09 | 12.53 | 13.34 | 14.09 | 13.59 | 11.24 | 9.64 | 8.22 | 12.96    |
| D23                       | 14.26 | 13.72 | 13.15 | 14.08 | 14.67 | 14.19 | 14.50 | 14.95 | 15.23 | 15.42 | 13.86 | 12.36 | 11.96 | 12.35 | 12.32 | 13.15 | 13.07 | 10.74 | 9.11 | 8.00 | 14.01    |
| D26                       | 13.61 | 12.96 | 12.67 | 13.94 | 13.49 | 13.58 | 13.86 | 14.07 | 14.64 | 14.97 | 13.78 | 12.69 | 11.94 | 12.00 | 12.61 | 13.78 | 13.16 | 11.08 | 9.27 | 8.19 | 13.38    |
| D29                       | 12.67 | 12.68 | 13.15 | 13.29 | 13.63 | 11.94 | 13.57 | 14.13 | 15.14 | 15.84 | 14.72 | 12.39 | 12.22 | 12.58 | 12.81 | 13.77 | 13.17 | 10.93 | 9.02 | 7.97 | 12.89    |
| D33                       | 14.11 | 12.66 | 13.43 | 13.53 | 15.46 | 13.27 | 13.44 | 13.85 | 14.54 | 15.11 | 13.34 | 11.88 | 11.49 | 11.80 | 11.95 | 12.79 | 11.10 | 10.81 | 9.15 | 7.84 | 13.41    |
| D36                       | 13.12 | 12.61 | 12.18 | 12.64 | 12.94 | 12.65 | 12.53 | 13.75 | 14.73 | 14.57 | 12.95 | 11.59 | 11.63 | 11.71 | 11.83 | 12.79 | 11.37 | 10.84 | 9.10 | 8.06 | 12.69    |
| D39                       | 12.54 | 12.53 | 11.66 | 11.61 | 12.94 | 11.63 | 12.13 | 13.19 | 13.97 | 14.38 | 13.33 | 11.33 | 11.80 | 12.05 | 12.16 | 12.96 | 11.75 | 10.73 | 9.21 | 8.10 | 12.06    |
| D43                       | 13.59 | 12.77 | 13.87 | 13.92 | 13.76 | 12.47 | 14.17 | 14.50 | 14.81 | 15.51 | 14.12 | 12.13 | 11.41 | 12.14 | 12.78 | 13.77 | 12.88 | 10.93 | 9.20 | 7.83 | 13.40    |
| D46                       | 13.58 | 11.73 | 13.20 | 12.14 | 11.79 | 12.22 | 12.35 | 12.76 | 13.59 | 14.26 | 13.80 | 11.86 | 11.82 | 12.39 | 12.37 | 13.17 | 12.71 | 11.18 | 9.44 | 8.22 | 12.44    |
| D49                       | 12.16 | 11.04 | 11.60 | 11.89 | 11.69 | 12.55 | 12.37 | 12.74 | 13.66 | 14.34 | 13.69 | 12.10 | 11.32 | 12.11 | 12.70 | 13.38 | 12.99 | 11.15 | 9.51 | 8.28 | 11.84    |



H1/3, Cm  
Generalized Beach Model (GBM)

| Test Case | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10                  | 11    | 12    | 13    | 14    | 15    | 16    | 17    | 18    | 19   | 20   | Ave   |
|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|-------|
|           |       |       |       |       |       |       |       |       |       | Gage Numbers        |       |       |       |       |       |       |       |       |      |      | 1-c   |
|           |       |       |       |       |       |       |       |       |       | Directional Series  |       |       |       |       |       |       |       |       |      |      |       |
| D51       | 15.24 | 13.52 | 13.42 | 13.66 | 14.06 | 15.04 | 13.80 | 14.34 | 14.94 | 15.35               | 13.55 | 12.42 | 12.34 | 11.91 | 12.26 | 13.61 | 12.45 | 10.69 | 8.99 | 8.11 | 14.16 |
| D52       | 13.90 | 13.18 | 13.07 | 13.41 | 13.98 | 12.25 | 14.33 | 14.52 | 15.23 | 15.45               | 13.98 | 12.79 | 12.96 | 12.69 | 13.01 | 13.76 | 12.76 | 10.80 | 9.27 | 8.30 | 13.30 |
| D53       | 13.49 | 13.15 | 13.12 | 13.04 | 12.53 | 12.97 | 13.22 | 13.97 | 14.68 | 14.86               | 13.82 | 11.83 | 12.60 | 12.18 | 12.48 | 13.65 | 13.22 | 11.33 | 9.65 | 8.46 | 13.05 |
| D61       | 15.04 | 13.57 | 12.52 | 14.81 | 13.72 | 13.75 | 14.83 | 13.73 | 13.30 | 13.12               | 12.12 | 10.96 | 11.11 | 10.71 | 11.00 | 11.70 | 11.31 | 9.61  | 8.10 | 7.62 | 13.90 |
| D62       | 14.49 | 13.00 | 13.25 | 13.61 | 13.66 | 12.20 | 13.42 | 13.38 | 13.59 | 13.84               | 12.94 | 11.34 | 11.48 | 11.26 | 11.53 | 12.48 | 11.44 | 10.13 | 8.47 | 7.79 | 13.37 |
| D63       | 13.14 | 13.97 | 11.48 | 14.46 | 15.03 | 13.77 | 14.54 | 14.38 | 14.74 | 14.40               | 13.22 | 10.90 | 11.96 | 11.58 | 11.80 | 12.82 | 11.33 | 10.36 | 8.48 | 7.99 | 13.64 |
| D64       | 14.05 | 13.73 | 14.08 | 12.59 | 12.86 | 13.26 | 12.58 | 13.06 | 13.29 | 13.23               | 12.66 | 11.59 | 11.54 | 11.44 | 11.47 | 12.48 | 11.81 | 10.44 | 8.84 | 7.98 | 13.43 |
| D65       | 14.10 | 14.00 | 13.27 | 12.95 | 14.25 | 14.72 | 13.91 | 14.16 | 13.74 | 13.53               | 12.60 | 11.36 | 11.41 | 10.94 | 11.60 | 12.16 | 11.82 | 10.16 | 8.31 | 7.51 | 13.88 |
| D66       | 14.10 | 12.74 | 13.93 | 12.78 | 12.67 | 12.90 | 12.77 | 13.14 | 13.14 | 13.23               | 12.41 | 11.13 | 11.59 | 11.28 | 11.28 | 12.10 | 11.79 | 9.99  | 8.42 | 7.69 | 13.18 |
| D67       | 13.20 | 13.40 | 13.52 | 13.17 | 12.99 | 12.88 | 13.06 | 13.48 | 14.20 | 14.44               | 13.10 | 11.05 | 11.88 | 11.60 | 11.92 | 13.07 | 11.83 | 10.03 | 8.68 | 8.13 | 13.14 |
| D68       | 13.53 | 13.23 | 14.07 | 12.53 | 12.66 | 12.97 | 12.76 | 12.98 | 13.48 | 13.78               | 12.87 | 11.36 | 11.79 | 11.21 | 11.66 | 12.57 | 11.24 | 10.38 | 8.56 | 7.78 | 13.17 |
|           |       |       |       |       |       |       |       |       |       | Non-Breaking Series |       |       |       |       |       |       |       |       |      |      |       |
| D71       | 8.79  | 7.96  | 8.07  | 7.84  | 7.88  | 8.92  | 7.84  | 7.97  | 8.48  | 9.20                | 9.46  | 10.00 | 9.33  | 9.07  | 9.75  | 11.16 | 10.25 | 9.84  | 8.59 | 7.95 | 8.24  |
| D72       | 8.02  | 7.64  | 7.66  | 7.72  | 7.80  | 7.39  | 7.81  | 8.09  | 8.52  | 9.13                | 9.28  | 9.26  | 9.90  | 9.73  | 9.86  | 10.48 | 9.80  | 9.96  | 8.83 | 8.37 | 7.71  |
| D73       | 7.94  | 7.66  | 7.68  | 7.52  | 7.15  | 7.98  | 7.61  | 7.72  | 8.20  | 8.79                | 8.99  | 9.30  | 9.47  | 9.44  | 9.58  | 10.27 | 9.93  | 9.69  | 8.62 | 8.00 | 7.66  |
| D81       | 9.37  | 8.11  | 8.56  | 9.10  | 8.65  | 8.13  | 9.17  | 9.24  | 9.39  | 9.41                | 9.11  | 9.28  | 9.07  | 9.35  | 9.07  | 9.41  | 9.72  | 8.75  | 7.71 | 7.14 | 8.66  |
| D82       | 8.52  | 8.03  | 8.10  | 8.13  | 8.09  | 7.49  | 7.99  | 7.98  | 8.25  | 8.57                | 8.60  | 8.41  | 8.79  | 8.76  | 8.74  | 9.46  | 8.49  | 9.02  | 8.07 | 7.69 | 8.06  |
| D83       | 8.20  | 8.70  | 7.51  | 7.59  | 8.90  | 9.20  | 8.52  | 9.14  | 9.56  | 9.41                | 9.24  | 7.86  | 9.20  | 9.19  | 9.25  | 10.08 | 8.68  | 9.35  | 9.43 | 7.75 | 8.35  |
| D84       | 8.26  | 8.16  | 8.28  | 7.67  | 7.65  | 8.02  | 7.81  | 8.00  | 8.18  | 8.43                | 8.39  | 8.92  | 9.03  | 8.76  | 8.63  | 8.98  | 8.37  | 8.94  | 8.45 | 7.73 | 8.01  |
| D85       | 8.84  | 8.34  | 8.68  | 7.04  | 7.77  | 9.28  | 7.75  | 8.67  | 7.10  | 9.20                | 9.03  | 8.77  | 8.95  | 8.89  | 8.74  | 9.13  | 9.17  | 8.46  | 7.70 | 7.41 | 8.32  |
| D86       | 8.68  | 7.72  | 8.49  | 7.69  | 7.48  | 7.72  | 7.79  | 7.66  | 7.95  | 8.17                | 8.14  | 8.67  | 8.69  | 8.85  | 8.50  | 8.99  | 8.41  | 8.89  | 8.16 | 7.66 | 7.96  |
| D87       | 7.81  | 8.15  | 8.26  | 7.62  | 7.60  | 7.84  | 7.61  | 7.63  | 8.21  | 8.65                | 8.58  | 8.37  | 8.84  | 9.13  | 9.04  | 9.77  | 9.04  | 9.34  | 8.58 | 7.88 | 7.88  |

APPENDIX F: SPECTRAL ANALYSIS RESULTS

## Ave.

F2

IFC, Sec (1/111C)  
Simplified Beach Model (ubM)

| Test Case           | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | Gage Numbers |      |      |      |      |      |      |      |      |      | 13   | 14   | 15   | 16   | 17 | 18 | 19 | 20 | Ave. |
|---------------------|------|------|------|------|------|------|------|------|------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|----|----|----|----|------|
|                     |      |      |      |      |      |      |      |      |      | 10           | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   |      |      |      |    |    |    |    |      |
| Directional Series  |      |      |      |      |      |      |      |      |      |              |      |      |      |      |      |      |      |      |      |      |      |      |      |    |    |    |    |      |
| 051                 | 1.74 | 1.75 | 1.75 | 2.53 | 2.44 | 2.44 | 2.49 | 2.44 | 2.44 | 2.44         | 2.44 | 2.44 | 2.49 | 2.44 | 2.44 | 2.44 | 2.44 | 2.49 | 2.49 | 2.49 | 2.49 | 2.45 | 2.11 |    |    |    |    |      |
| 052                 | 2.46 | 1.68 | 2.49 | 1.69 | 1.69 | 2.49 | 1.69 | 1.69 | 1.69 | 1.68         | 1.68 | 2.51 | 1.79 | 1.79 | 2.43 | 2.43 | 2.48 | 2.40 | 2.40 | 2.40 | 2.40 | 2.45 | 2.08 |    |    |    |    |      |
| 053                 | 1.74 | 1.75 | 1.77 | 2.40 | 2.40 | 2.48 | 2.40 | 2.40 | 2.40 | 2.40         | 2.40 | 2.48 | 2.45 | 2.40 | 2.40 | 2.38 | 2.50 | 2.40 | 2.40 | 2.40 | 2.40 | 2.37 | 2.09 |    |    |    |    |      |
| 061                 | 1.25 | 1.25 | 1.25 | 2.53 | 2.53 | 2.53 | 2.49 | 2.50 | 2.50 | 2.50         | 2.50 | 2.58 | 2.50 | 2.50 | 2.58 | 2.58 | 2.54 | 2.58 | 2.58 | 2.58 | 2.58 | 1.89 |      |    |    |    |    |      |
| 062                 | 2.46 | 1.25 | 1.20 | 1.23 | 1.20 | 2.49 | 1.23 | 1.22 | 1.22 | 1.26         | 1.26 | 2.53 | 2.40 | 2.42 | 1.26 | 1.25 | 2.49 | 2.45 | 2.45 | 2.45 | 2.49 | 1.64 |      |    |    |    |    |      |
| 063                 | 2.45 | 2.5  | 1.24 | 1.24 | 1.24 | 1.24 | 1.24 | 2.45 | 2.45 | 2.51         | 2.51 | 2.50 | 2.51 | 2.51 | 2.51 | 2.51 | 2.51 | 2.51 | 2.51 | 2.51 | 2.51 | 1.65 |      |    |    |    |    |      |
| 064                 | 1.27 | 1.27 | 1.26 | 1.22 | 1.27 | 2.53 | 1.22 | 1.21 | 1.21 | 2.44         | 2.44 | 2.45 | 1.25 | 2.46 | 2.44 | 2.44 | 2.53 | 2.44 | 2.44 | 2.44 | 2.44 | 1.46 |      |    |    |    |    |      |
| 065                 | 1.26 | 1.22 | 1.26 | 2.50 | 1.24 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50         | 2.50 | 2.50 | 2.53 | 2.53 | 2.51 | 2.51 | 2.51 | 2.51 | 2.51 | 2.51 | 2.51 | 1.66 |      |    |    |    |    |      |
| 066                 | 1.19 | 1.29 | 1.26 | 1.22 | 1.22 | 2.49 | 1.22 | 1.21 | 1.21 | 1.21         | 1.21 | 2.51 | 2.45 | 2.42 | 2.45 | 2.45 | 2.49 | 2.45 | 2.45 | 2.45 | 2.45 | 1.44 |      |    |    |    |    |      |
| 067                 | 1.25 | 1.24 | 1.22 | 2.40 | 2.40 | 2.48 | 2.40 | 2.40 | 2.40 | 2.40         | 2.40 | 2.48 | 2.45 | 2.45 | 2.40 | 2.38 | 2.50 | 2.39 | 2.39 | 2.39 | 2.39 | 1.83 |      |    |    |    |    |      |
| 068                 | 2.49 | 1.27 | 1.20 | 1.21 | 1.29 | 1.23 | 2.49 | 2.43 | 2.43 | 2.42         | 2.42 | 2.38 | 2.49 | 2.49 | 2.42 | 2.42 | 2.43 | 2.42 | 2.42 | 2.42 | 2.42 | 1.45 |      |    |    |    |    |      |
| Non-Breaking Series |      |      |      |      |      |      |      |      |      |              |      |      |      |      |      |      |      |      |      |      |      |      |      |    |    |    |    |      |
| 071                 | 2.44 | 1.75 | 1.75 | 1.74 | 2.44 | 2.44 | 2.49 | 2.44 | 2.44 | 2.44         | 2.44 | 2.44 | 2.49 | 2.44 | 2.44 | 1.74 | 2.44 | 1.74 | 2.49 | 2.49 | 2.49 | 2.09 |      |    |    |    |    |      |
| 072                 | 2.46 | 1.68 | 1.82 | 1.69 | 1.69 | 2.49 | 1.69 | 1.69 | 1.69 | 1.69         | 1.69 | 1.66 | 1.79 | 1.78 | 1.68 | 1.68 | 1.75 | 1.68 | 1.68 | 1.68 | 1.68 | 1.97 |      |    |    |    |    |      |
| 073                 | 1.74 | 1.75 | 1.77 | 1.71 | 2.40 | 2.48 | 2.40 | 2.40 | 2.40 | 2.40         | 2.40 | 1.76 | 1.79 | 2.40 | 2.40 | 2.40 | 2.48 | 2.40 | 2.40 | 2.40 | 2.40 | 1.97 |      |    |    |    |    |      |
| 081                 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 2.50 | 1.25 | 1.25 | 1.25 | 1.25         | 1.24 | 2.51 | 1.26 | 1.25 | 1.24 | 1.24 | 1.24 | 2.51 | 2.51 | 2.51 | 2.51 | 1.46 |      |    |    |    |    |      |
| 082                 | 2.46 | 1.25 | 1.21 | 1.23 | 1.24 | 2.49 | 1.23 | 1.23 | 1.27 | 1.27         | 1.26 | 1.22 | 1.23 | 1.23 | 1.26 | 1.26 | 1.25 | 1.26 | 1.26 | 1.26 | 1.26 | 1.65 |      |    |    |    |    |      |
| 083                 | 1.25 | 1.25 | 1.24 | 1.25 | 1.24 | 1.24 | 1.24 | 2.45 | 2.45 | 2.45         | 2.49 | 2.50 | 2.50 | 2.50 | 2.49 | 2.50 | 2.49 | 2.51 | 2.51 | 2.51 | 2.51 | 1.25 |      |    |    |    |    |      |
| 084                 | 1.27 | 1.30 | 1.26 | 1.21 | 1.27 | 1.22 | 1.22 | 1.22 | 1.22 | 1.21         | 2.44 | 1.25 | 1.28 | 1.24 | 2.44 | 2.46 | 2.53 | 2.44 | 2.46 | 2.46 | 2.46 | 1.86 |      |    |    |    |    |      |
| 085                 | 1.20 | 1.20 | 1.27 | 2.50 | 2.49 | 2.49 | 2.50 | 1.24 | 2.45 | 2.45         | 2.48 | 2.45 | 2.49 | 2.53 | 2.51 | 2.48 | 2.53 | 2.51 | 2.51 | 2.51 | 2.51 | 1.23 |      |    |    |    |    |      |
| 086                 | 1.19 | 1.29 | 1.26 | 1.21 | 1.22 | 1.23 | 1.23 | 1.21 | 1.21 | 1.21         | 1.21 | 1.26 | 1.29 | 1.29 | 2.43 | 2.43 | 1.26 | 2.44 | 2.44 | 2.44 | 2.44 | 1.23 |      |    |    |    |    |      |
| 087                 | 1.23 | 1.23 | 1.22 | 1.24 | 1.25 | 2.48 | 1.25 | 2.40 | 2.40 | 2.40         | 2.40 | 2.48 | 2.45 | 2.40 | 2.39 | 2.38 | 2.54 | 2.39 | 2.39 | 2.39 | 2.39 | 1.44 |      |    |    |    |    |      |

hmd, Cm  
Generalized Beach Model (GBM)

| Test Case                 | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12    | 13    | 14    | 15    | 16    | 17    | 18    | 19   | 20    | Ave.  |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|
| Unimodal Series           |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |      |       |       |
| S01                       | 14.85 | 13.64 | 12.58 | 14.30 | 14.14 | 14.76 | 14.13 | 13.82 | 13.72 | 13.73 | 12.66 | 11.80 | 12.15 | 11.72 | 11.58 | 12.21 | 11.81 | 10.27 | 9.14 | 8.49  | 14.04 |
| S09                       | 13.50 | 14.05 | 14.06 | 14.43 | 14.40 | 13.14 | 14.12 | 13.82 | 13.97 | 14.18 | 13.18 | 11.40 | 11.36 | 11.20 | 11.90 | 12.46 | 11.31 | 10.57 | 9.24 | 8.57  | 13.93 |
| S13                       | 15.90 | 11.70 | 14.15 | 12.28 | 11.92 | 14.25 | 12.19 | 13.87 | 12.21 | 13.16 | 12.56 | 11.72 | 11.00 | 10.98 | 11.92 | 12.54 | 11.66 | 10.40 | 9.26 | 8.66  | 13.37 |
| S21                       | 12.82 | 13.89 | 13.71 | 13.84 | 14.11 | 14.31 | 13.87 | 13.97 | 14.03 | 14.06 | 12.87 | 10.82 | 11.63 | 11.55 | 11.72 | 12.19 | 11.65 | 10.21 | 9.02 | 8.29  | 13.78 |
| S25                       | 15.20 | 14.00 | 12.72 | 13.38 | 14.10 | 12.97 | 13.69 | 13.89 | 13.86 | 13.71 | 12.49 | 10.74 | 11.78 | 11.32 | 11.30 | 11.74 | 10.53 | 9.84  | 8.56 | 7.97  | 13.73 |
| S33                       | 13.31 | 13.73 | 14.37 | 13.22 | 12.87 | 13.76 | 13.23 | 13.18 | 13.29 | 13.41 | 12.39 | 11.39 | 11.59 | 11.54 | 11.66 | 12.10 | 11.61 | 10.26 | 9.04 | 8.42  | 13.54 |
| S37                       | 11.66 | 11.40 | 10.89 | 12.46 | 11.33 | 10.63 | 12.04 | 11.35 | 11.05 | 10.79 | 10.02 | 9.54  | 9.54  | 9.71  | 9.96  | 10.15 | 9.34  | 8.45  | 7.61 | 11.39 |       |
| S45                       | 11.04 | 12.26 | 12.84 | 12.15 | 11.65 | 11.40 | 11.87 | 11.37 | 11.40 | 11.40 | 10.85 | 8.85  | 10.27 | 10.24 | 10.19 | 10.32 | 9.73  | 8.98  | 7.83 | 7.14  | 11.89 |
| S49                       | 12.15 | 11.68 | 11.90 | 11.08 | 11.56 | 11.64 | 10.88 | 10.96 | 11.19 | 11.38 | 10.31 | 9.33  | 9.79  | 9.42  | 9.60  | 9.95  | 9.38  | 8.65  | 7.73 | 7.7   | 11.67 |
| S57                       | 11.10 | 12.30 | 11.48 | 12.41 | 12.40 | 11.61 | 12.27 | 11.68 | 11.60 | 11.48 | 10.75 | 9.31  | 9.59  | 10.40 | 10.12 | 10.75 | 9.42  | 8.80  | 7.74 | 7.4   | 11.88 |
| S61                       | 10.76 | 11.63 | 10.31 | 12.45 | 12.28 | 11.61 | 12.28 | 11.11 | 10.81 | 10.55 | 9.78  | 8.87  | 9.77  | 9.04  | 9.36  | 9.64  | 8.88  | 8.38  | 7.43 | 6.67  | 11.51 |
| S69                       | 11.87 | 11.15 | 11.92 | 12.39 | 11.39 | 11.62 | 12.30 | 11.96 | 11.80 | 11.65 | 10.70 | 9.35  | 9.99  | 9.81  | 9.98  | 10.36 | 9.97  | 8.78  | 7.67 | 7.67  | 11.72 |
| Mode Superposition Series |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |      |       |       |
| D01                       | 8.01  | 6.84  | 7.10  | 7.51  | 7.34  | 8.49  | 7.23  | 7.92  | 8.30  | 8.51  | 8.24  | 7.92  | 7.48  | 7.92  | 8.23  | 8.55  | 8.27  | 8.15  | 7.52 | 7.18  | 7.55  |
| D02                       | 14.59 | 12.36 | 12.87 | 13.80 | 12.59 | 12.60 | 13.14 | 12.35 | 12.55 | 12.71 | 12.06 | 11.30 | 11.10 | 10.38 | 11.38 | 12.39 | 10.98 | 10.13 | 8.82 | 8.04  | 13.14 |
| D03                       | 14.64 | 12.71 | 13.19 | 14.20 | 13.49 | 14.31 | 13.70 | 13.20 | 13.29 | 13.27 | 12.24 | 11.25 | 11.17 | 10.57 | 11.30 | 12.27 | 11.45 | 10.13 | 8.93 | 8.4   | 13.76 |
| D04                       | 11.72 | 10.01 | 10.07 | 10.94 | 10.60 | 11.59 | 11.10 | 11.29 | 11.57 | 11.71 | 10.99 | 10.53 | 10.33 | 10.22 | 10.38 | 10.84 | 10.29 | 9.53  | 8.44 | 7.91  | 10.82 |
| D05                       | 10.99 | 9.29  | 10.29 | 10.80 | 10.19 | 10.73 | 10.48 | 10.13 | 10.42 | 10.76 | 10.33 | 10.11 | 9.81  | 9.30  | 10.17 | 10.84 | 9.95  | 9.32  | 8.33 | 7.77  | 10.38 |
| D06                       | 14.12 | 12.10 | 12.46 | 13.78 | 13.09 | 13.97 | 13.29 | 12.59 | 12.84 | 13.03 | 12.15 | 11.27 | 10.39 | 10.54 | 11.56 | 12.11 | 11.26 | 10.29 | 9.14 | 8.43  | 13.25 |
| D07                       | 13.37 | 11.38 | 11.50 | 12.34 | 11.95 | 12.49 | 12.50 | 12.39 | 12.54 | 12.51 | 11.54 | 11.06 | 11.17 | 10.30 | 10.86 | 11.50 | 10.71 | 9.98  | 8.85 | 8.19  | 12.17 |
| D08                       | 7.90  | 6.65  | 7.47  | 7.68  | 7.31  | 7.82  | 7.53  | 7.34  | 7.62  | 7.97  | 7.84  | 7.82  | 7.33  | 7.52  | 8.05  | 8.49  | 7.78  | 7.91  | 7.45 | 7.17  | 7.47  |
| D09                       | 13.28 | 11.41 | 11.53 | 12.63 | 12.21 | 13.10 | 12.55 | 12.42 | 12.74 | 12.81 | 11.91 | 11.33 | 10.27 | 10.58 | 11.27 | 11.95 | 11.14 | 10.13 | 9.08 | 8.34  | 12.36 |
| Directional Series        |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |      |       |       |
| D13                       | 14.28 | 14.49 | 13.97 | 15.49 | 15.28 | 14.05 | 14.95 | 15.04 | 15.15 | 14.84 | 13.33 | 11.42 | 11.36 | 11.66 | 11.97 | 12.58 | 12.06 | 10.34 | 8.98 | 8.22  | 14.59 |
| D16                       | 13.68 | 13.68 | 13.31 | 14.64 | 14.96 | 13.60 | 14.38 | 14.30 | 14.41 | 14.17 | 12.89 | 11.30 | 10.89 | 11.48 | 11.80 | 12.35 | 11.81 | 10.06 | 8.87 | 8.07  | 13.98 |
| D19                       | 13.59 | 12.84 | 12.46 | 13.69 | 13.66 | 12.89 | 13.47 | 13.52 | 13.75 | 13.79 | 12.86 | 11.17 | 11.08 | 11.60 | 12.03 | 12.63 | 11.84 | 10.40 | 9.21 | 8.25  | 13.19 |
| D23                       | 14.63 | 14.22 | 13.37 | 14.71 | 15.32 | 13.93 | 14.48 | 14.59 | 14.63 | 14.48 | 13.05 | 11.70 | 11.48 | 11.79 | 11.81 | 12.30 | 11.96 | 10.15 | 8.99 | 8.15  | 14.36 |
| D26                       | 13.87 | 13.35 | 12.86 | 14.21 | 13.76 | 13.42 | 13.71 | 13.43 | 13.67 | 13.79 | 12.75 | 11.42 | 11.13 | 11.26 | 11.88 | 12.56 | 11.76 | 10.29 | 9.04 | 8.22  | 13.58 |
| D29                       | 13.23 | 13.05 | 13.48 | 13.78 | 14.02 | 12.00 | 13.80 | 13.77 | 14.21 | 14.37 | 13.10 | 11.11 | 11.02 | 11.58 | 11.99 | 12.21 | 11.57 | 10.20 | 8.90 | 8.10  | 13.26 |
| D33                       | 14.17 | 13.02 | 13.48 | 13.56 | 13.63 | 13.26 | 13.31 | 13.46 | 13.99 | 14.20 | 12.83 | 11.11 | 10.84 | 11.57 | 11.59 | 12.12 | 10.69 | 10.15 | 8.92 | 8.04  | 13.52 |
| D36                       | 13.40 | 12.88 | 12.26 | 12.79 | 13.31 | 12.86 | 12.74 | 13.26 | 13.81 | 13.89 | 12.57 | 10.97 | 10.93 | 11.36 | 11.52 | 12.09 | 10.60 | 10.18 | 8.94 | 8.18  | 12.92 |
| D39                       | 12.81 | 12.92 | 11.81 | 12.15 | 12.65 | 12.22 | 12.25 | 12.54 | 13.04 | 13.34 | 12.43 | 10.54 | 10.71 | 11.23 | 11.53 | 12.05 | 10.66 | 10.11 | 8.94 | 8.12  | 12.43 |
| D43                       | 13.75 | 13.22 | 14.09 | 13.86 | 14.05 | 12.67 | 13.98 | 13.96 | 14.18 | 14.26 | 12.98 | 11.29 | 10.72 | 11.37 | 11.96 | 12.45 | 11.70 | 10.17 | 8.85 | 7.63  | 13.61 |
| D46                       | 13.97 | 12.18 | 13.47 | 12.48 | 11.91 | 12.16 | 12.62 | 12.54 | 12.95 | 13.16 | 12.39 | 10.76 | 10.81 | 11.31 | 11.60 | 11.91 | 11.10 | 10.14 | 8.93 | 8.15  | 12.69 |
| D49                       | 12.04 | 11.66 | 11.97 | 11.99 | 11.81 | 12.36 | 12.21 | 12.11 | 12.49 | 12.62 | 11.87 | 10.78 | 10.28 | 10.97 | 11.14 | 11.47 | 11.23 | 9.95  | 8.80 | 8.14  | 11.97 |

HmL, Cm  
Generalized Beach Model (GBM)

| Test Case           | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | Gage Numbers |       |       |       |       |       |       |       |       |      | 18   | 19    | 20 | Ave. 1-6 |
|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|-------|----|----------|
|                     |       |       |       |       |       |       |       |       |       | 10           | 11    | 12    | 13    | 14    | 15    | 16    | 17    |       |      |      |       |    |          |
| Directional Series  |       |       |       |       |       |       |       |       |       |              |       |       |       |       |       |       |       |       |      |      |       |    |          |
| 051                 | 15.11 | 13.49 | 13.52 | 13.60 | 14.03 | 14.76 | 13.68 | 13.76 | 14.03 | 14.03        | 12.69 | 11.63 | 11.43 | 11.27 | 11.76 | 12.44 | 11.52 | 10.30 | 9.02 | 8.31 | 14.09 |    |          |
| 052                 | 14.27 | 13.12 | 13.44 | 13.72 | 14.18 | 12.33 | 13.76 | 13.85 | 14.03 | 13.90        | 12.72 | 11.48 | 12.17 | 11.93 | 11.66 | 12.06 | 11.30 | 10.20 | 9.00 | 8.28 | 13.51 |    |          |
| 053                 | 13.87 | 13.09 | 13.66 | 13.19 | 12.84 | 13.10 | 13.28 | 13.63 | 13.90 | 13.87        | 12.80 | 10.93 | 11.17 | 11.37 | 11.81 | 12.38 | 11.55 | 10.63 | 9.31 | 8.40 | 13.29 |    |          |
| 061                 | 15.16 | 13.98 | 12.89 | 15.04 | 14.34 | 14.32 | 15.08 | 13.77 | 13.20 | 12.85        | 11.93 | 10.79 | 11.10 | 10.68 | 11.14 | 11.61 | 11.16 | 9.67  | 8.49 | 7.96 | 14.29 |    |          |
| 062                 | 14.72 | 13.44 | 13.94 | 14.17 | 14.51 | 13.06 | 13.84 | 13.35 | 13.41 | 13.49        | 12.59 | 10.93 | 11.28 | 11.17 | 11.44 | 12.10 | 11.02 | 9.96  | 8.62 | 7.91 | 13.97 |    |          |
| 063                 | 13.71 | 14.33 | 11.91 | 14.29 | 14.96 | 13.98 | 14.54 | 14.32 | 14.28 | 14.07        | 12.82 | 10.64 | 11.75 | 11.35 | 11.59 | 12.48 | 10.95 | 10.20 | 8.90 | 8.25 | 13.86 |    |          |
| 064                 | 14.17 | 14.29 | 14.58 | 13.21 | 13.32 | 13.79 | 13.25 | 13.19 | 13.33 | 13.52        | 12.77 | 11.19 | 11.33 | 11.34 | 11.77 | 12.25 | 11.16 | 10.30 | 8.97 | 8.18 | 13.89 |    |          |
| 065                 | 14.74 | 14.24 | 14.01 | 13.47 | 14.94 | 15.35 | 14.27 | 14.17 | 13.92 | 13.55        | 12.31 | 11.17 | 11.20 | 10.92 | 11.29 | 11.87 | 11.39 | 9.88  | 8.55 | 7.84 | 14.46 |    |          |
| 066                 | 14.78 | 13.08 | 14.94 | 13.36 | 13.31 | 13.59 | 13.20 | 12.93 | 12.97 | 13.00        | 12.18 | 10.72 | 11.63 | 11.17 | 11.19 | 11.82 | 11.05 | 9.79  | 8.58 | 7.92 | 13.84 |    |          |
| 067                 | 13.87 | 13.97 | 13.74 | 13.52 | 13.63 | 13.16 | 13.65 | 13.79 | 14.14 | 14.15        | 12.97 | 10.75 | 11.51 | 11.45 | 11.69 | 12.53 | 11.08 | 9.96  | 8.76 | 8.27 | 13.65 |    |          |
| 068                 | 13.82 | 13.80 | 14.47 | 13.02 | 13.44 | 13.62 | 12.90 | 13.01 | 13.41 | 13.60        | 12.65 | 11.10 | 11.18 | 11.39 | 11.52 | 12.11 | 11.08 | 10.08 | 8.73 | 8.06 | 13.69 |    |          |
| Non-Breaking Series |       |       |       |       |       |       |       |       |       |              |       |       |       |       |       |       |       |       |      |      |       |    |          |
| 071                 | 8.90  | 8.07  | 8.27  | 7.92  | 8.06  | 8.99  | 7.96  | 8.03  | 8.44  | 8.87         | 8.75  | 8.69  | 8.07  | 8.20  | 8.79  | 9.50  | 8.91  | 8.54  | 7.81 | 7.41 | 8.37  |    |          |
| 072                 | 8.41  | 7.83  | 7.95  | 7.93  | 8.08  | 7.52  | 7.97  | 8.09  | 8.43  | 8.73         | 8.51  | 8.10  | 8.59  | 8.51  | 8.47  | 8.97  | 8.24  | 8.23  | 7.62 | 7.34 | 7.95  |    |          |
| 073                 | 8.33  | 7.83  | 8.10  | 7.80  | 7.41  | 8.14  | 7.87  | 7.90  | 8.22  | 8.57         | 8.40  | 8.16  | 8.02  | 8.25  | 8.50  | 8.76  | 8.31  | 8.26  | 7.60 | 7.38 | 7.94  |    |          |
| 081                 | 9.72  | 8.43  | 8.87  | 9.27  | 8.98  | 8.60  | 9.37  | 9.29  | 9.40  | 9.38         | 8.84  | 8.70  | 8.76  | 9.00  | 8.66  | 8.88  | 9.15  | 8.25  | 7.55 | 7.20 | 8.98  |    |          |
| 082                 | 8.90  | 8.37  | 8.58  | 8.63  | 8.67  | 8.03  | 8.45  | 8.24  | 8.43  | 8.64         | 8.39  | 8.09  | 8.17  | 8.26  | 8.31  | 8.80  | 7.96  | 8.20  | 7.66 | 7.36 | 8.53  |    |          |
| 083                 | 8.71  | 9.06  | 7.93  | 7.72  | 9.21  | 9.47  | 8.77  | 9.57  | 9.73  | 9.73         | 9.26  | 7.56  | 8.79  | 8.97  | 9.64  | 9.46  | 8.29  | 8.66  | 7.89 | 7.42 | 8.69  |    |          |
| 084                 | 8.58  | 8.53  | 8.75  | 8.09  | 8.06  | 8.46  | 8.28  | 8.32  | 8.50  | 8.64         | 8.45  | 8.40  | 8.50  | 8.44  | 8.48  | 8.66  | 7.87  | 8.47  | 7.98 | 7.64 | 8.41  |    |          |
| 085                 | 9.42  | 8.68  | 9.25  | 7.38  | 8.24  | 9.79  | 8.10  | 9.08  | 9.33  | 9.39         | 8.89  | 8.61  | 8.57  | 8.72  | 8.47  | 8.82  | 8.56  | 8.05  | 7.48 | 7.20 | 8.79  |    |          |
| 086                 | 9.24  | 7.92  | 9.10  | 8.13  | 8.00  | 8.24  | 8.18  | 8.08  | 8.26  | 8.48         | 8.30  | 8.10  | 8.43  | 8.55  | 8.33  | 8.75  | 7.76  | 8.34  | 7.83 | 7.56 | 8.44  |    |          |
| 087                 | 8.23  | 8.51  | 8.59  | 8.01  | 7.96  | 8.19  | 8.09  | 8.21  | 8.60  | 8.91         | 8.74  | 8.02  | 8.32  | 8.61  | 8.73  | 9.22  | 8.30  | 8.55  | 7.95 | 7.60 | 8.25  |    |          |

APPENDIX G: LINEAR CROSS-SHORE ARRAY SPECTRA

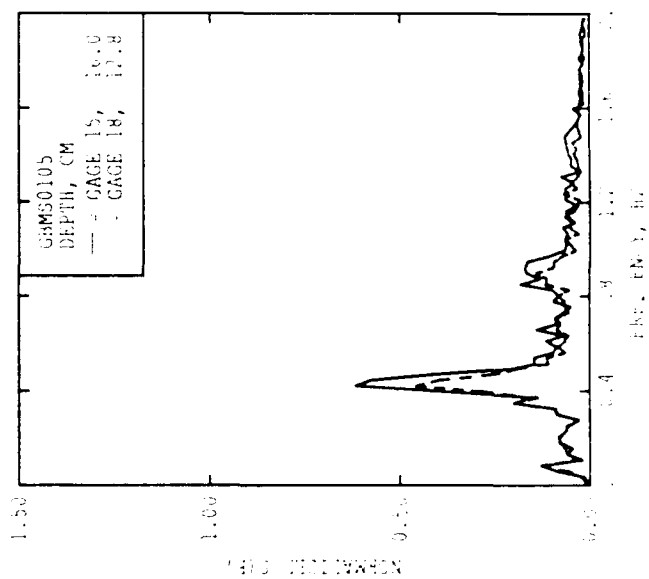
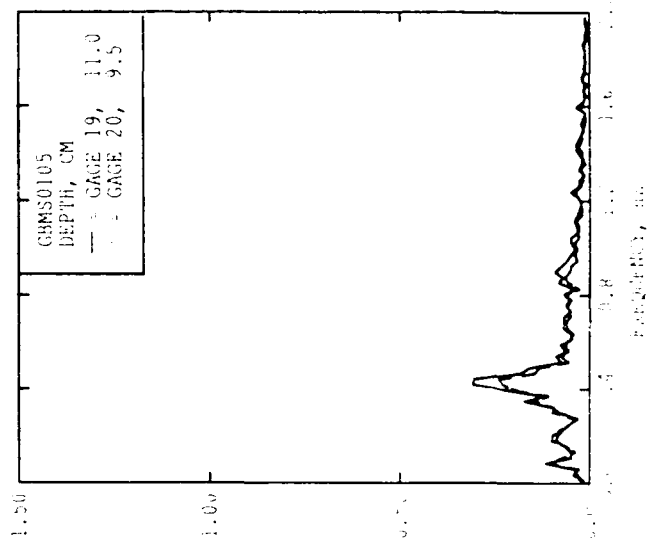
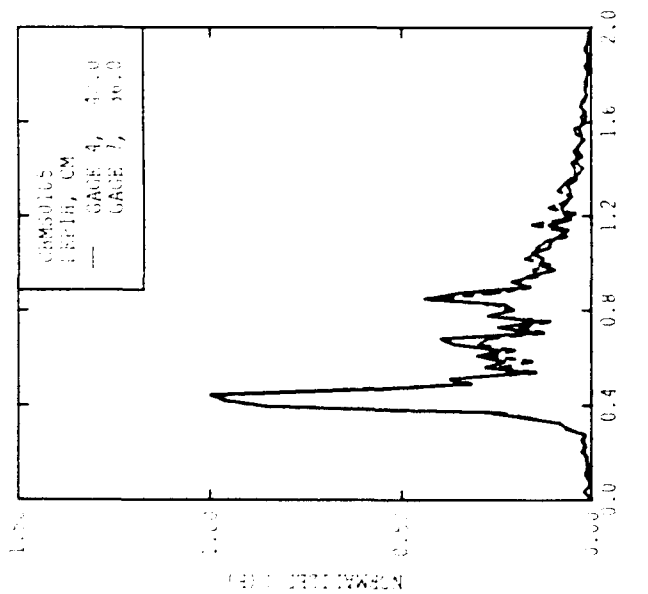
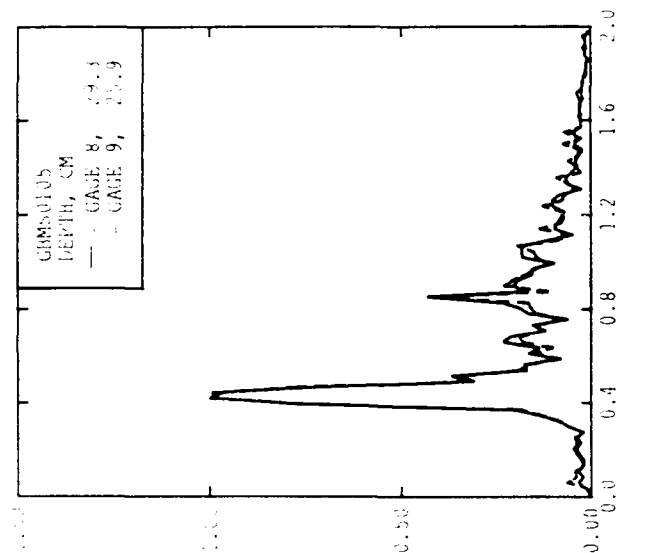
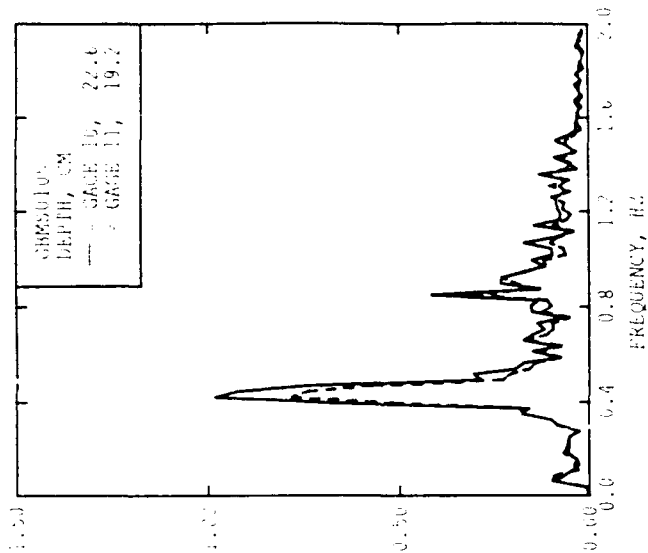
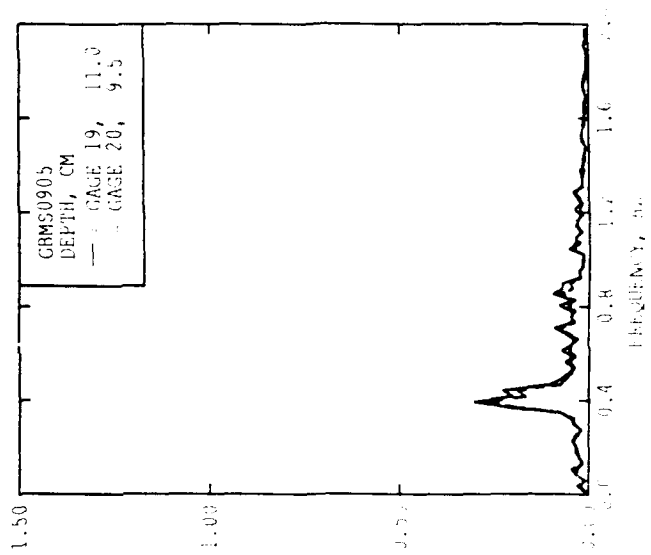
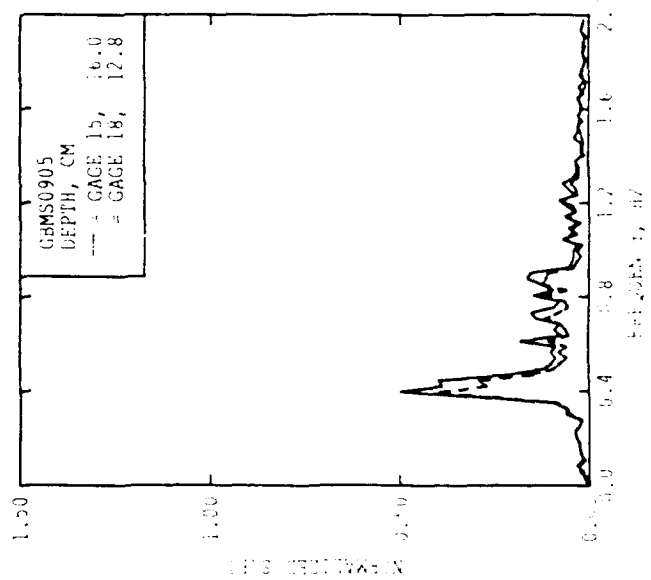
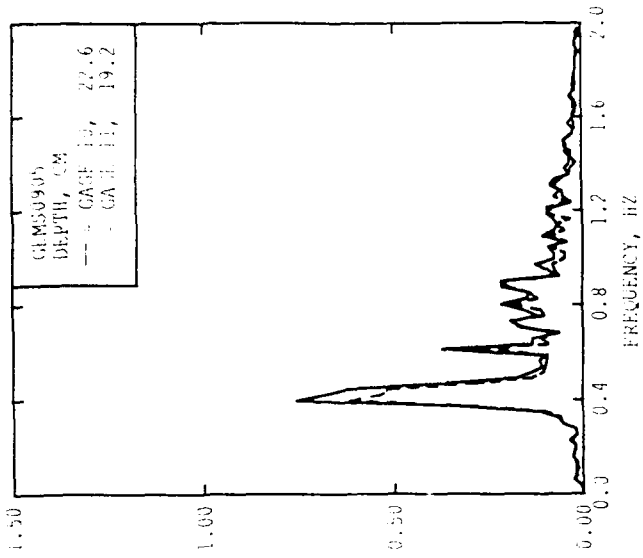
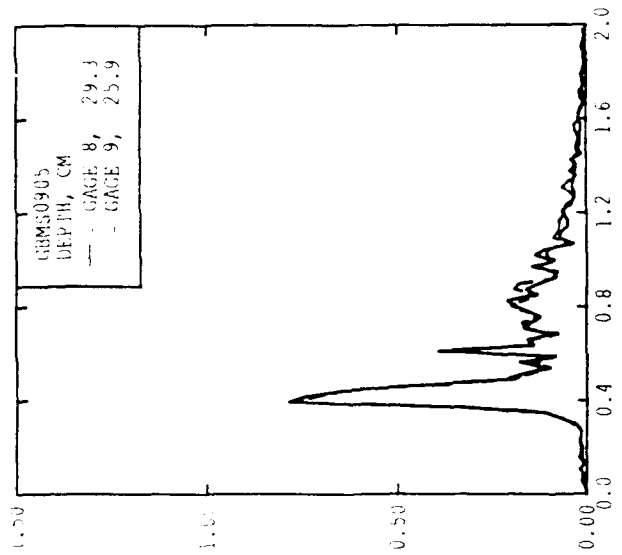
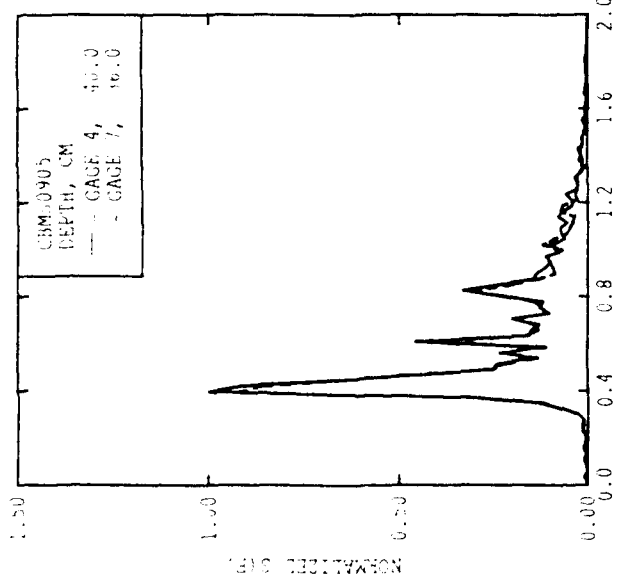
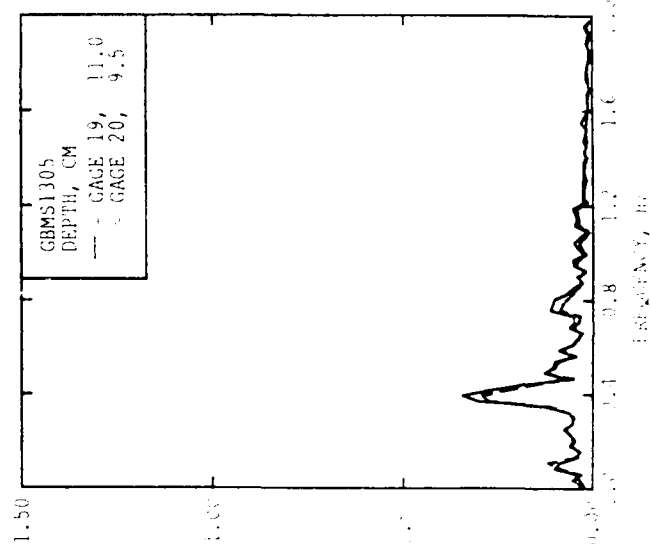
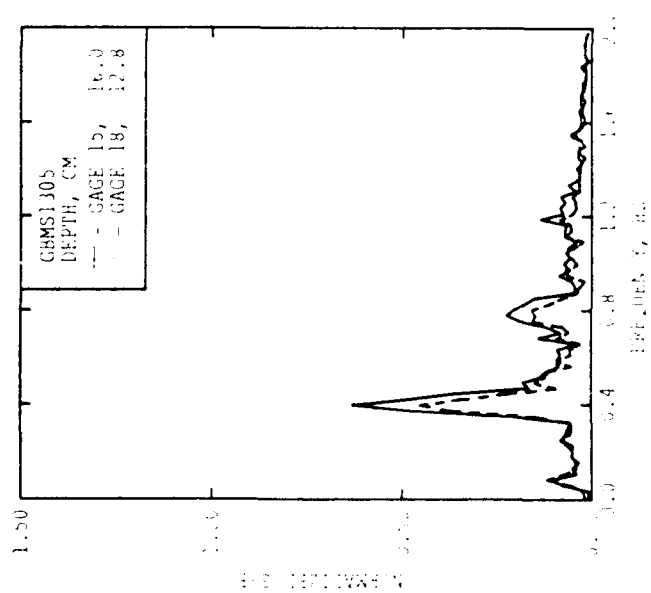
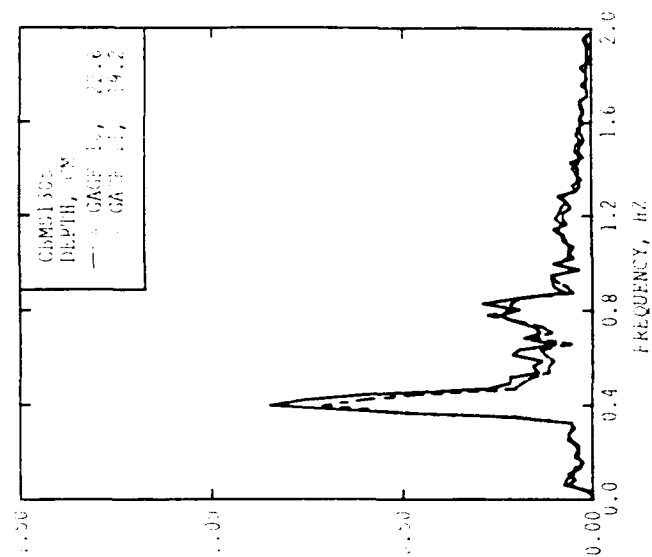
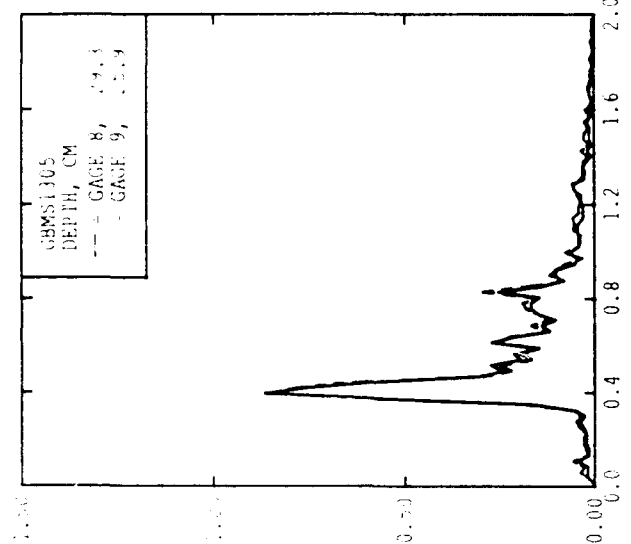
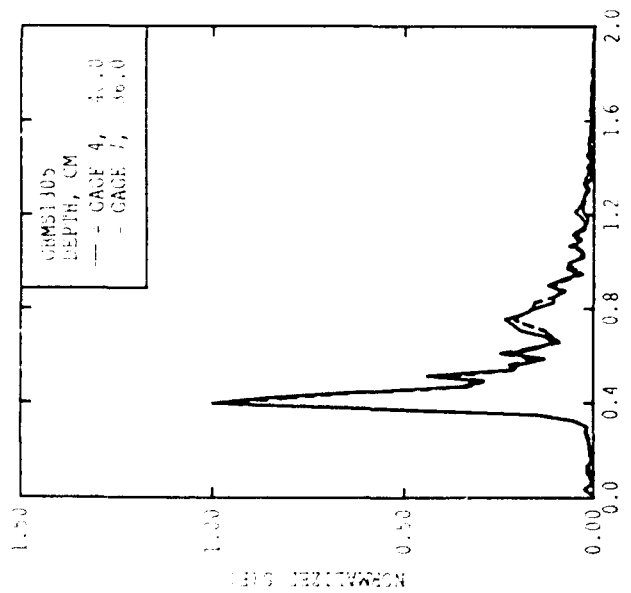
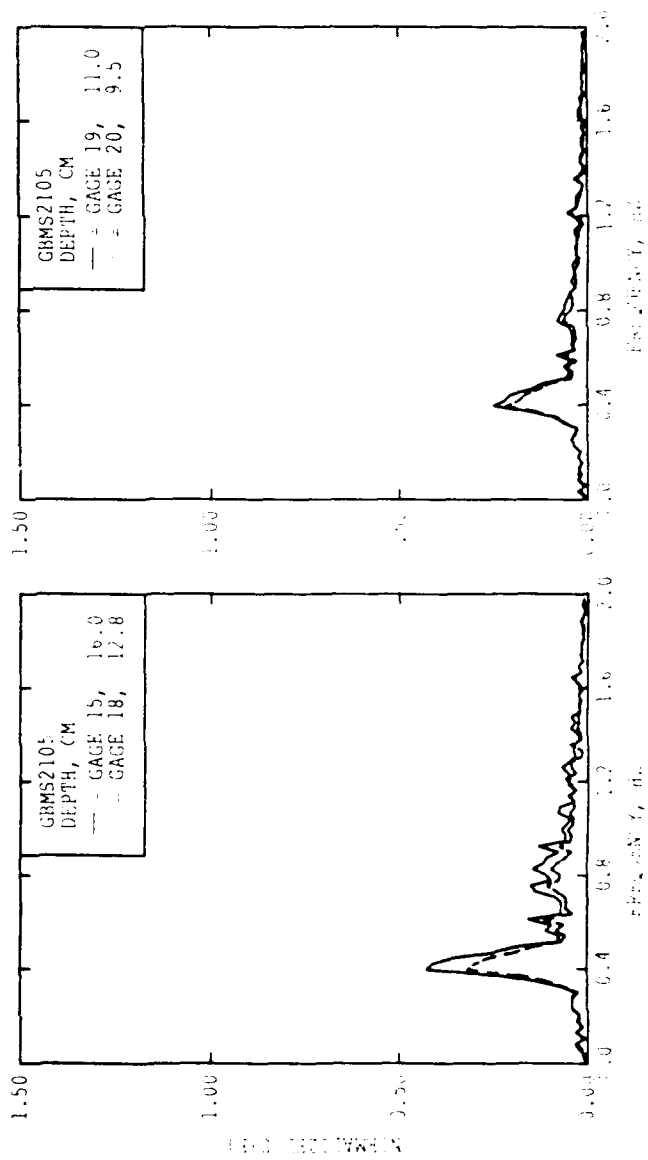
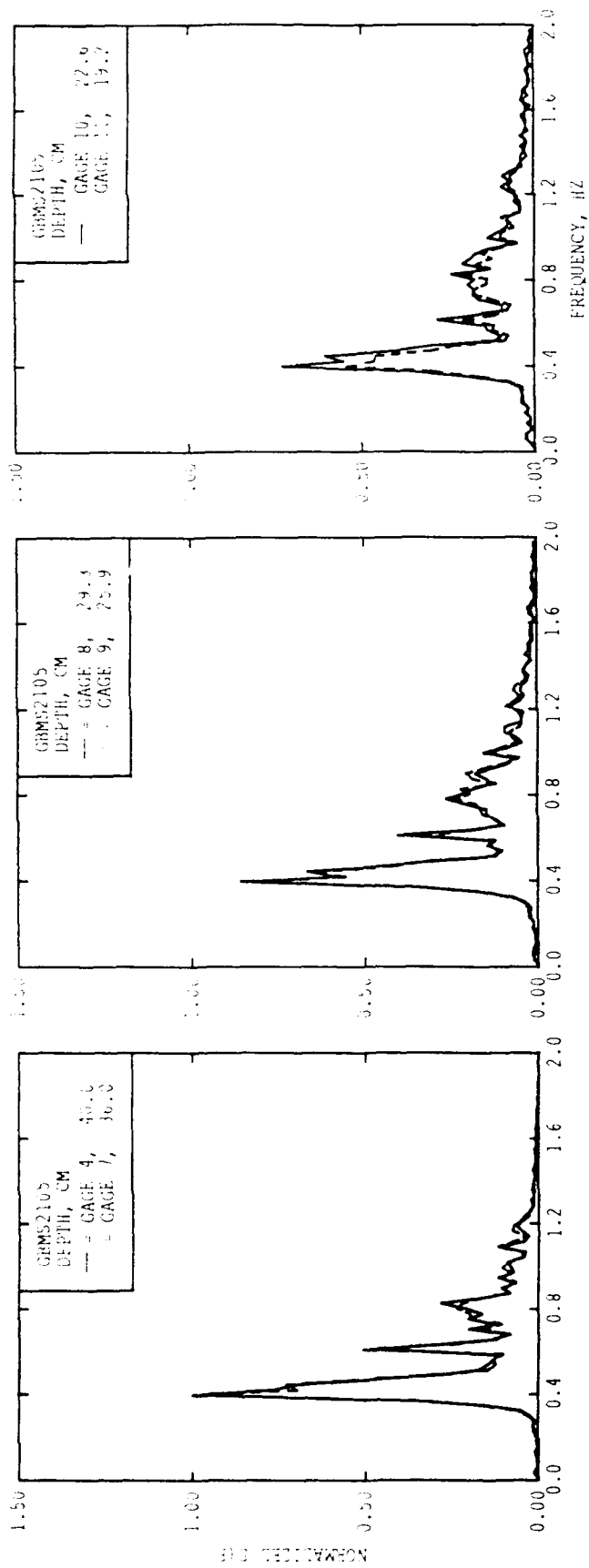


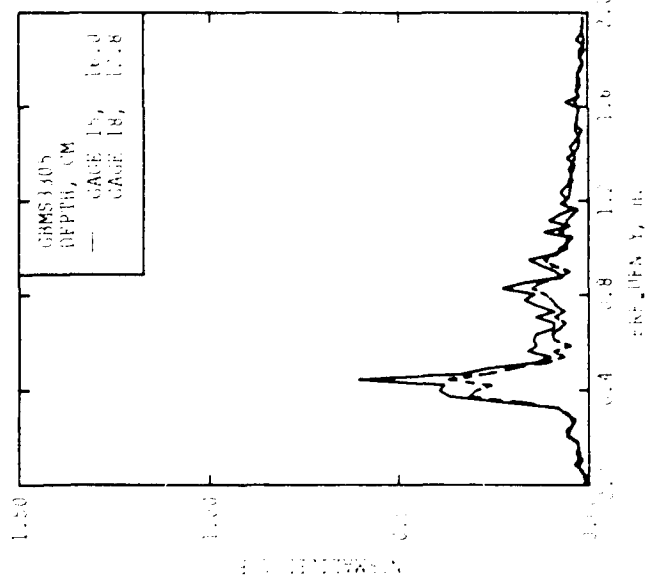
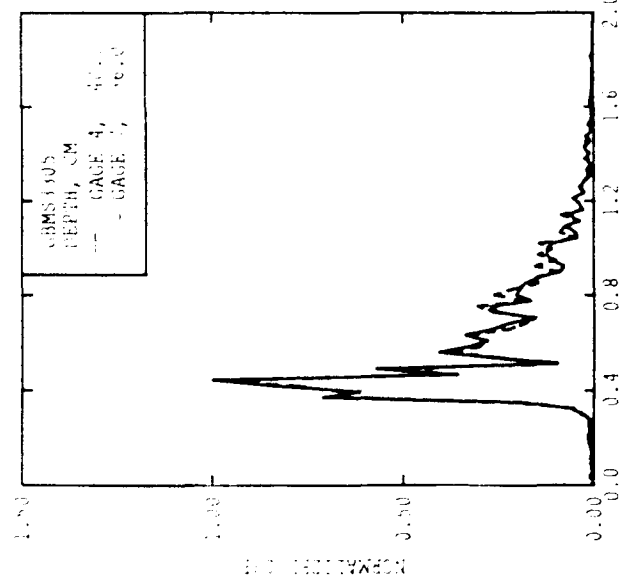
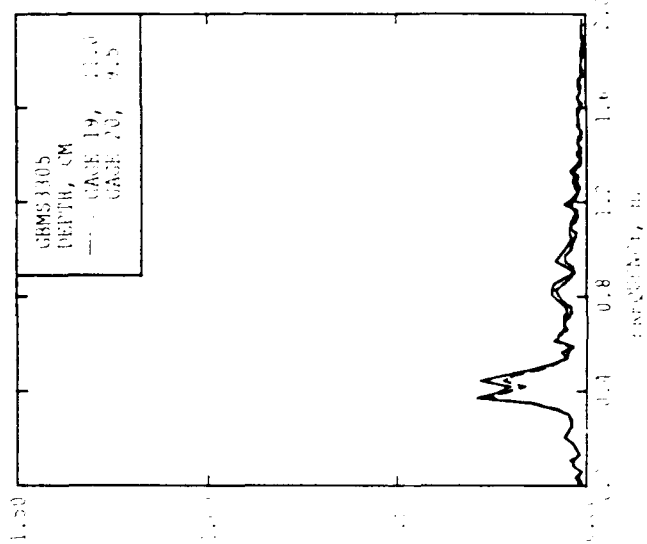
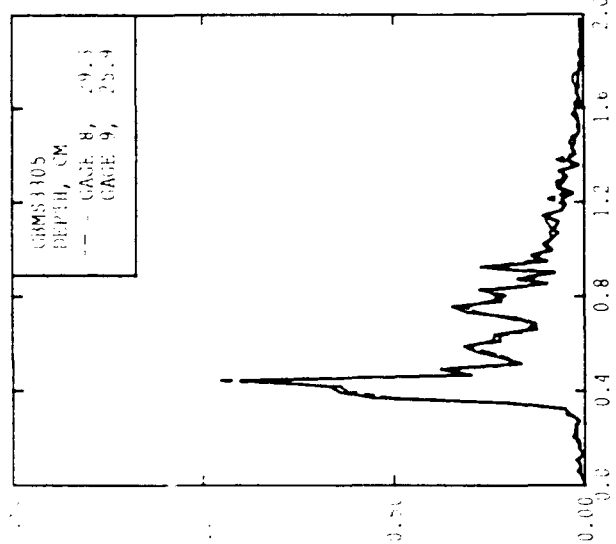
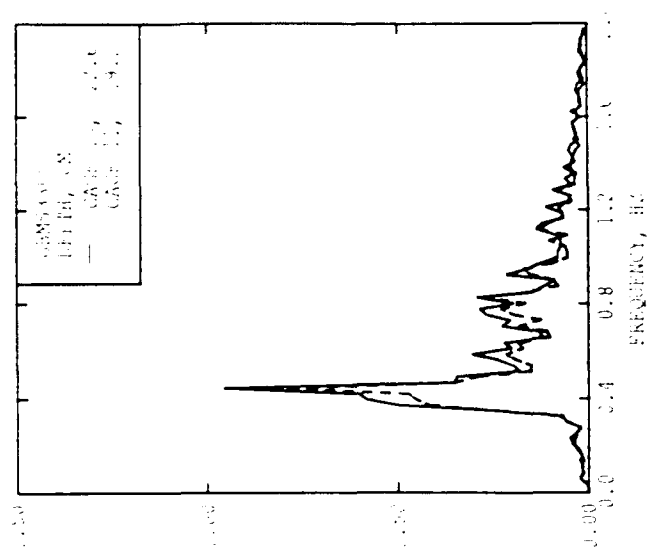
FIG. 10.3, Hz

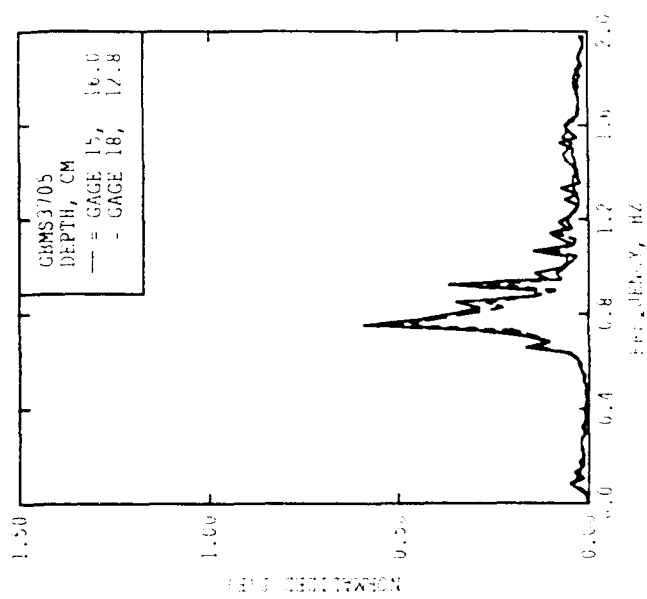
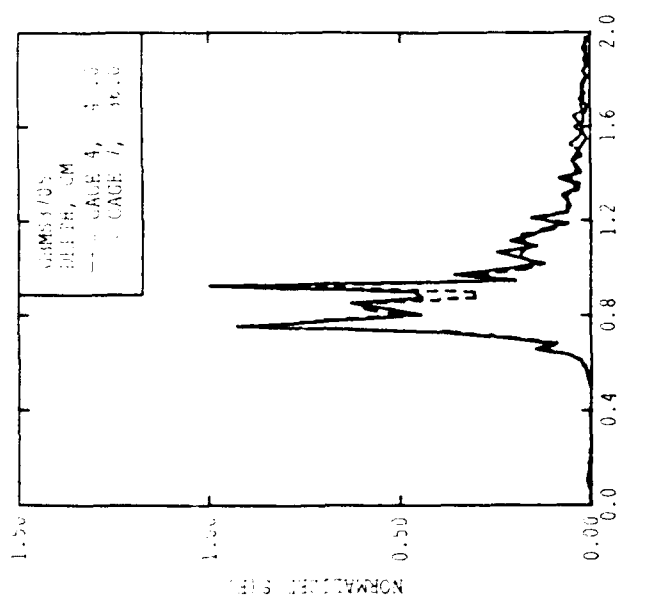
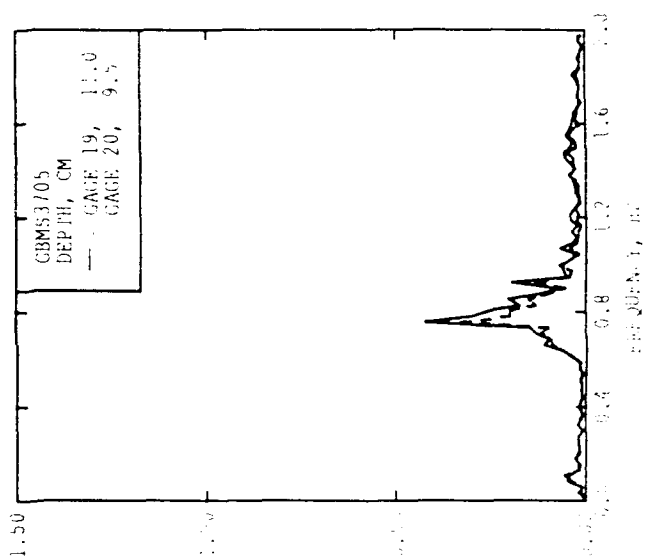
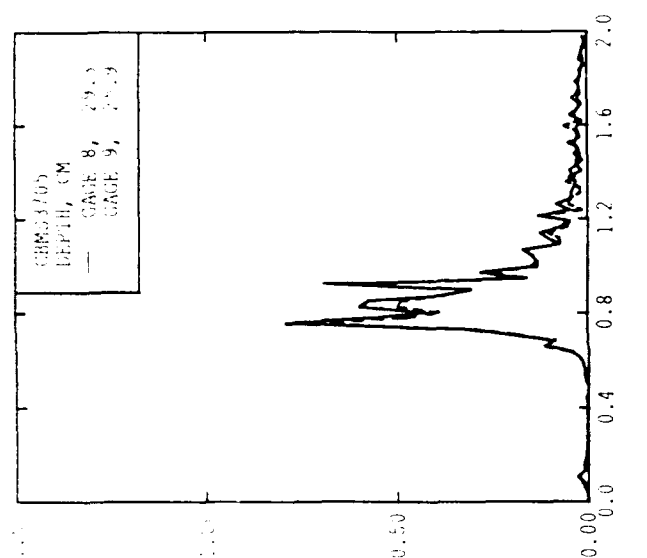
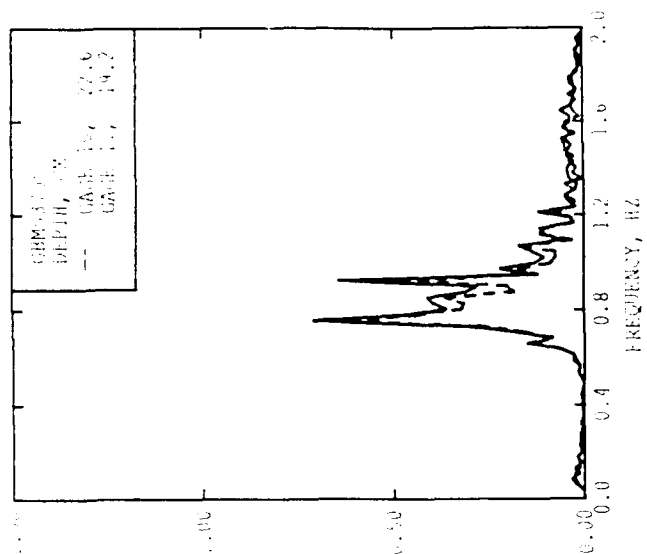


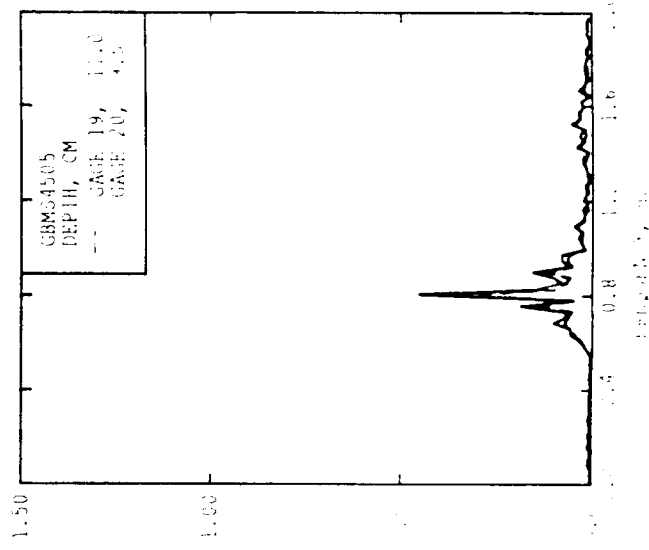
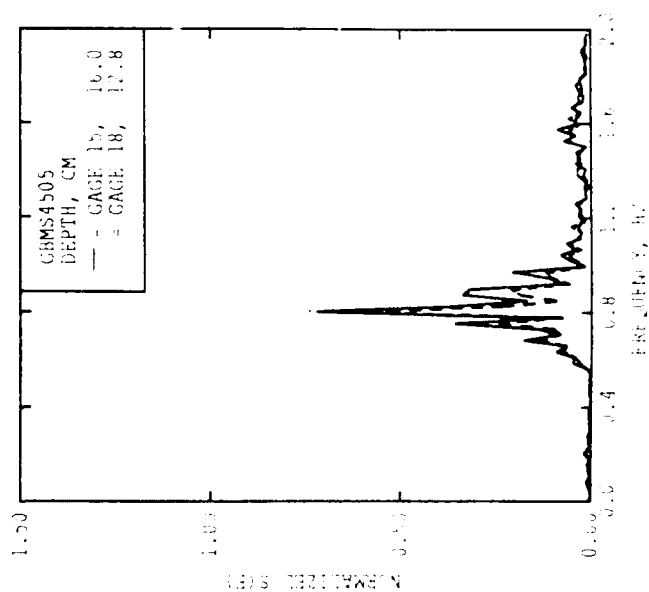
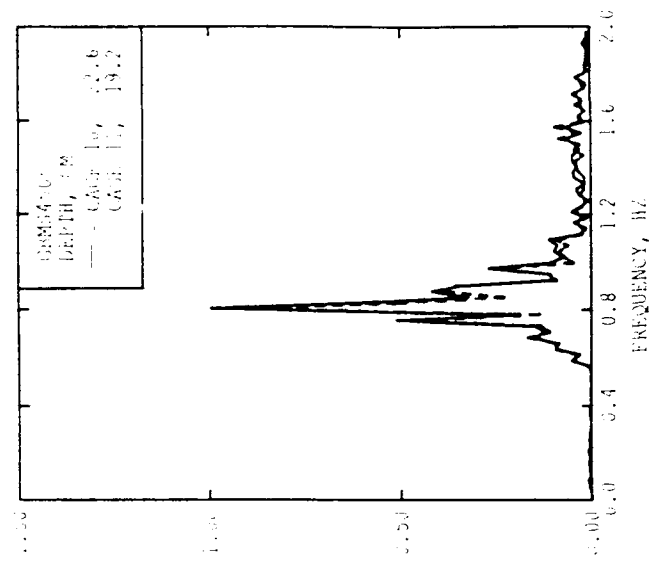
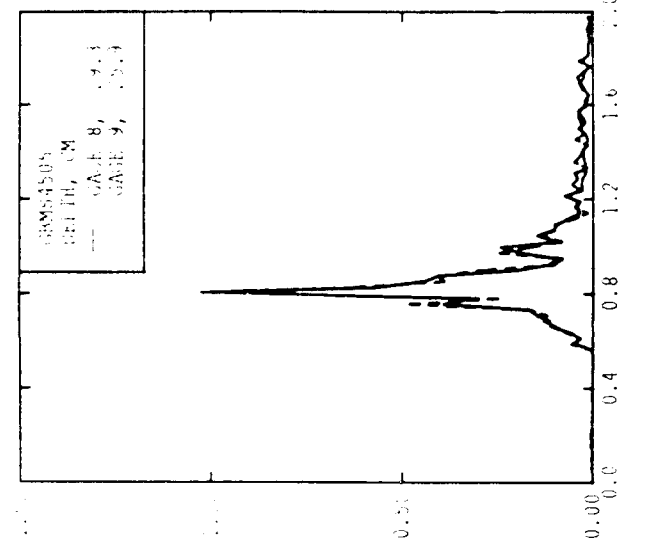
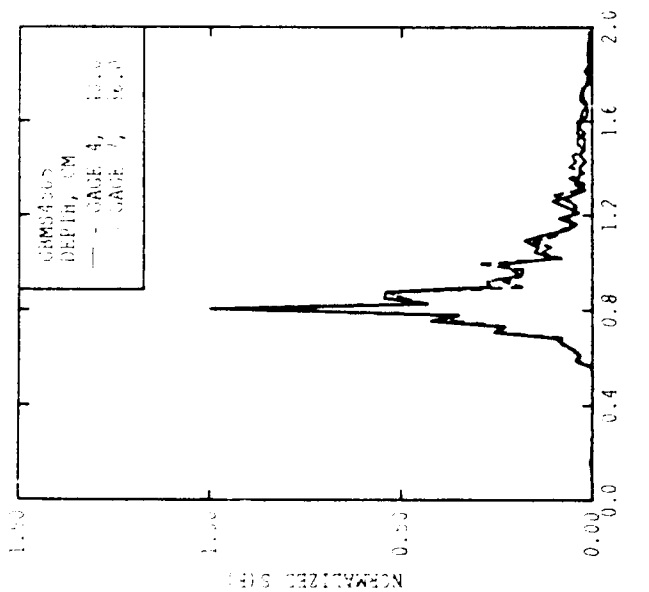


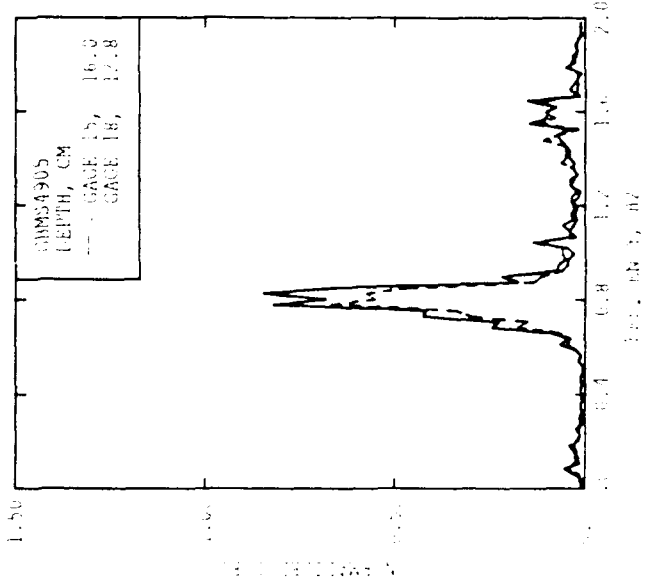
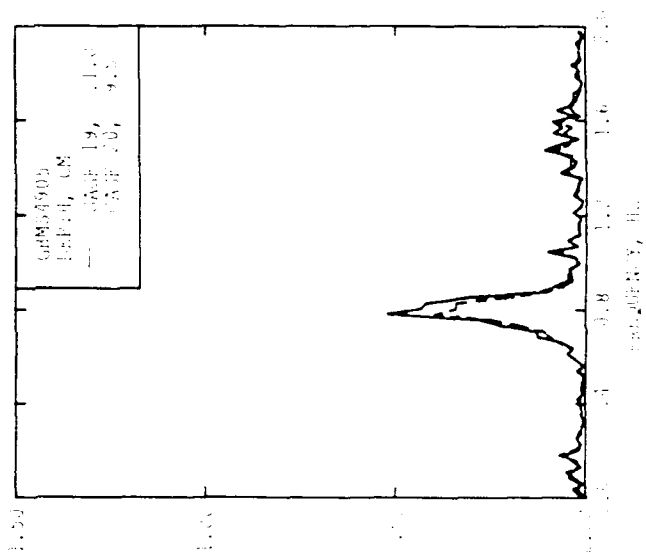
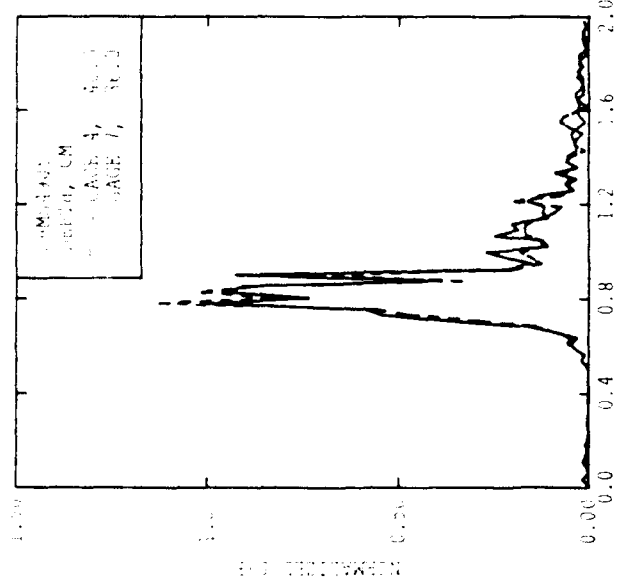
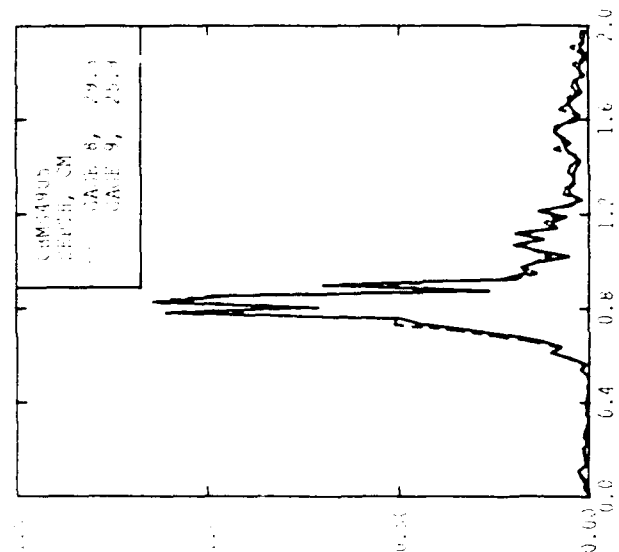
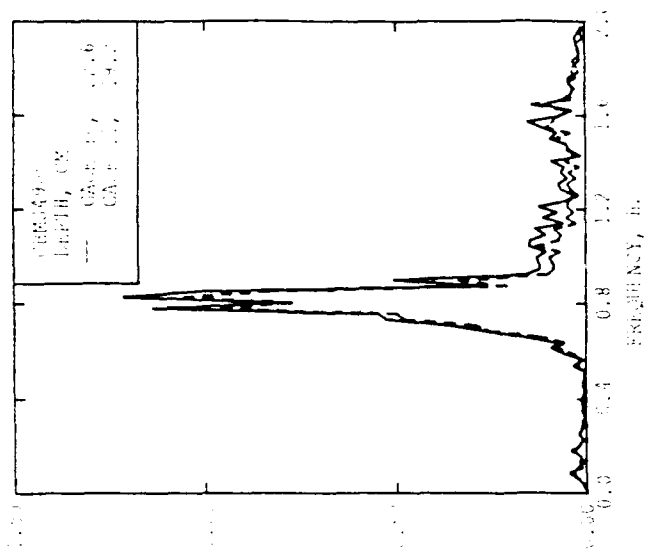


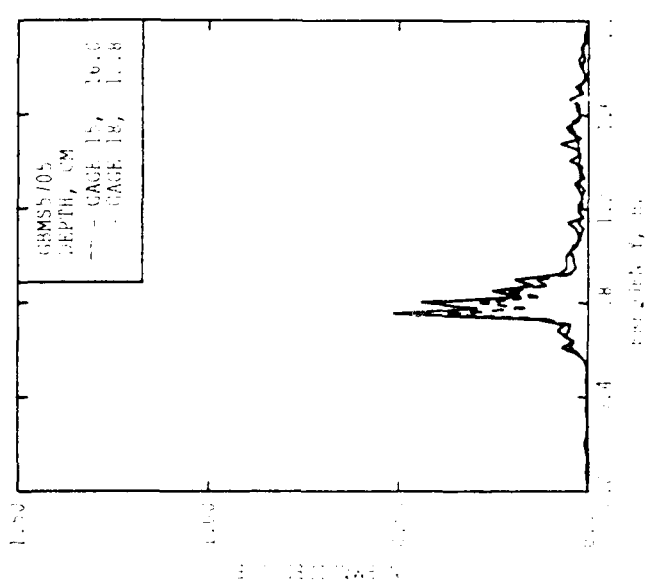
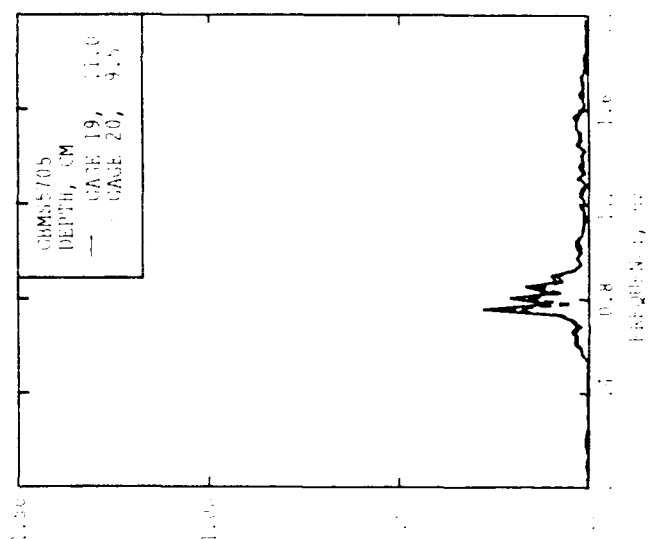
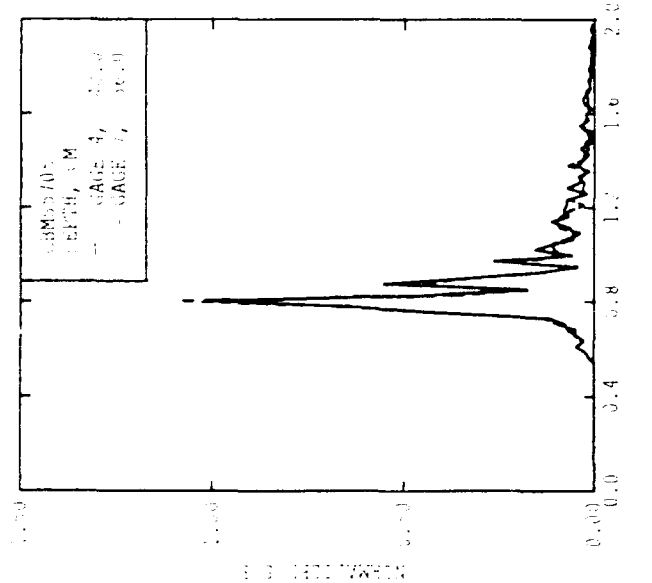
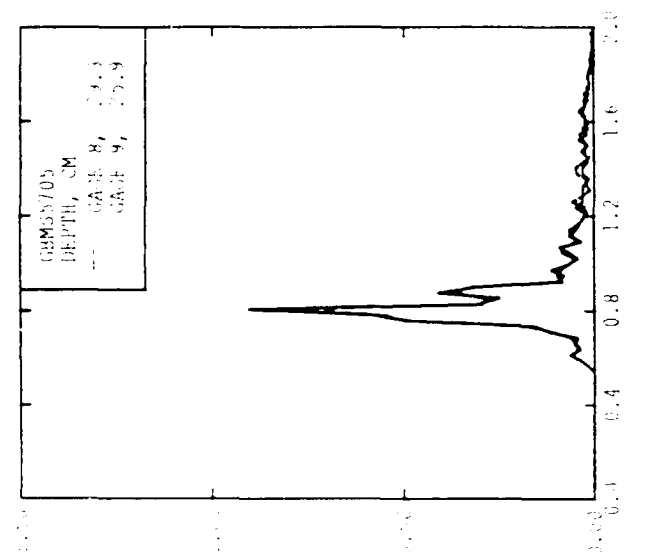
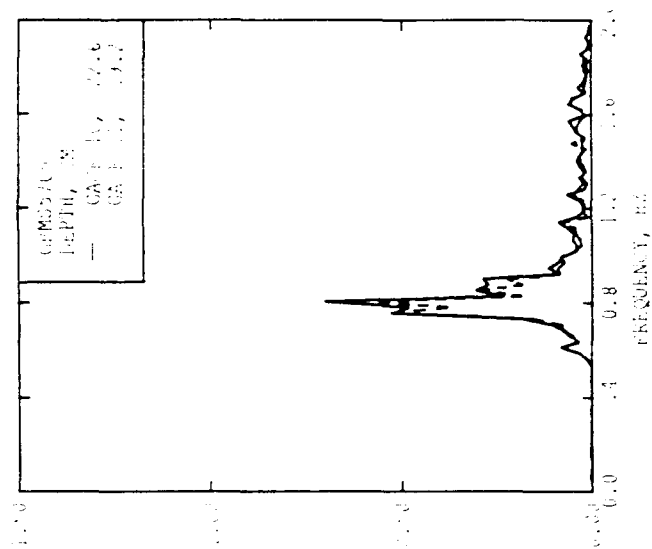




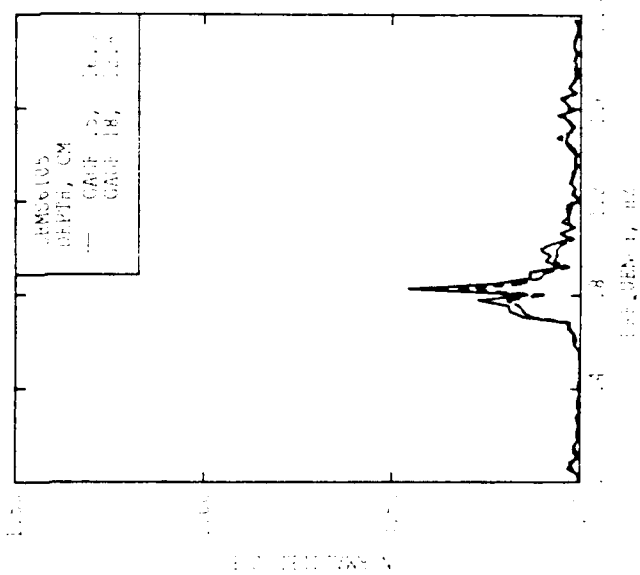
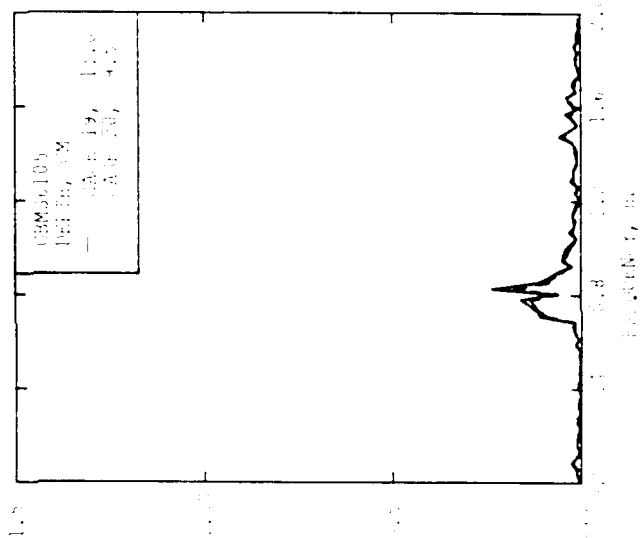
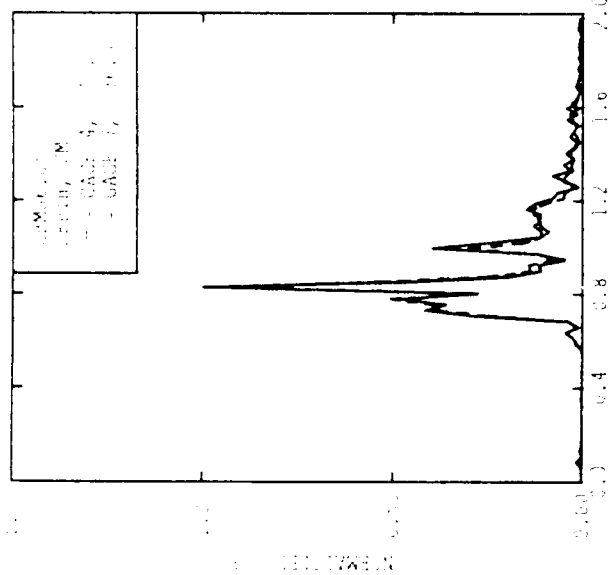
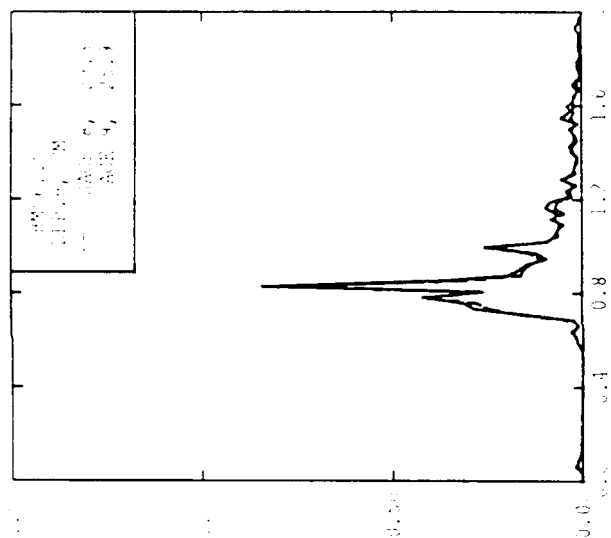
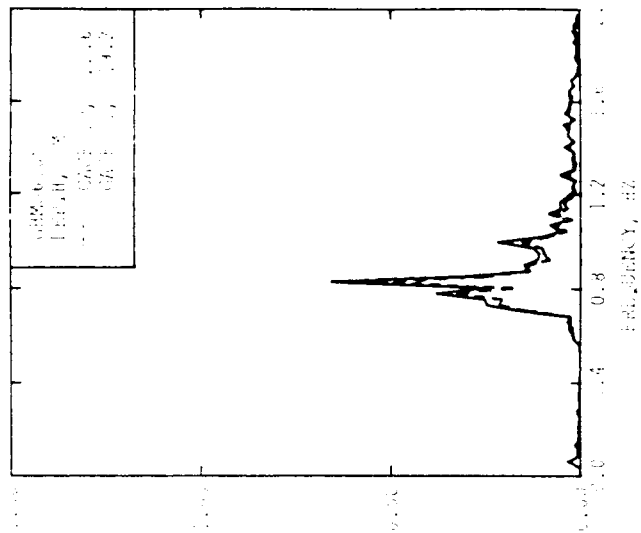


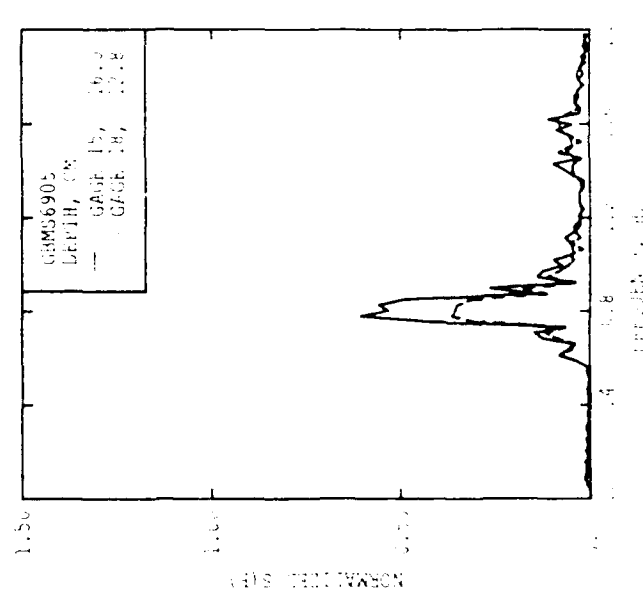
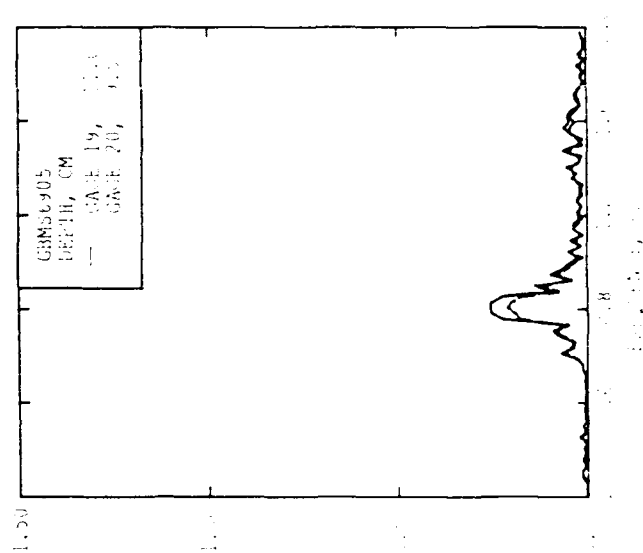
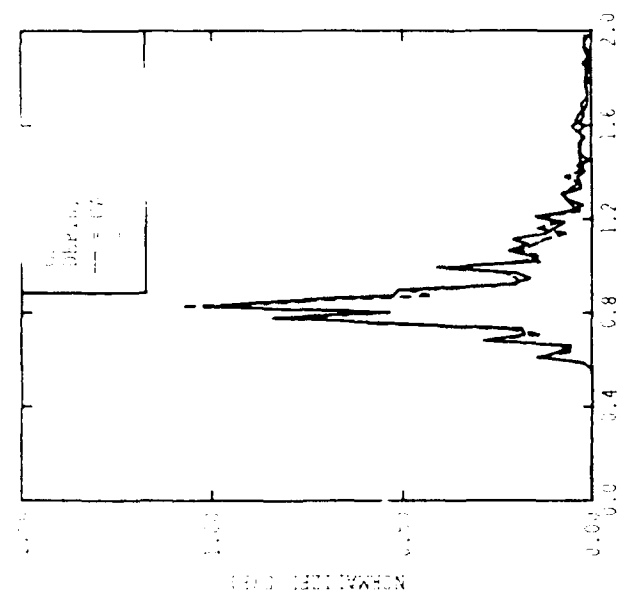
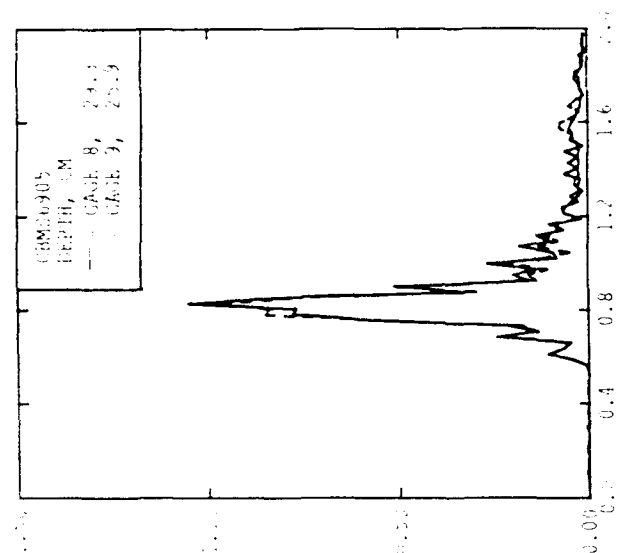
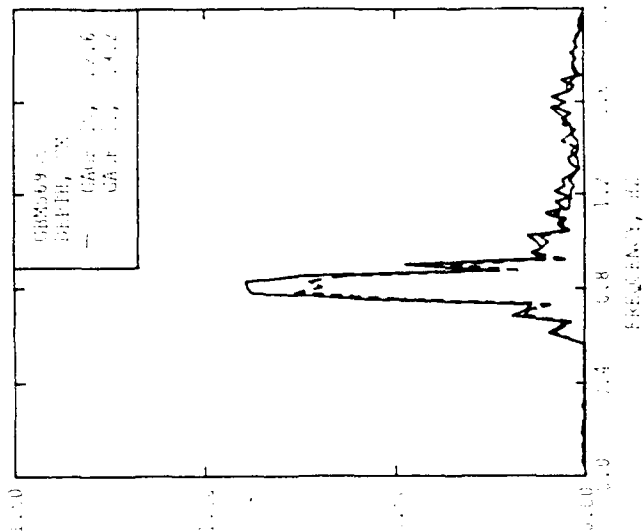


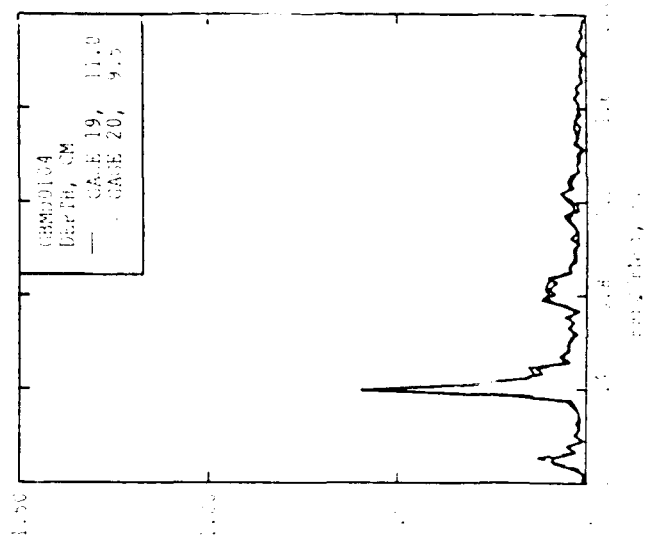
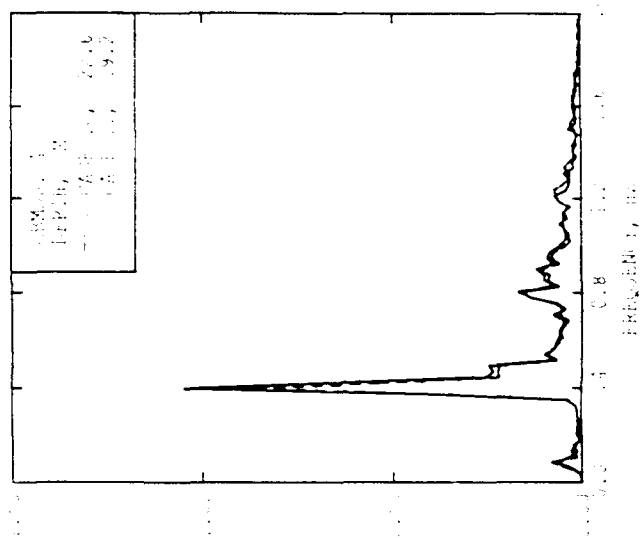


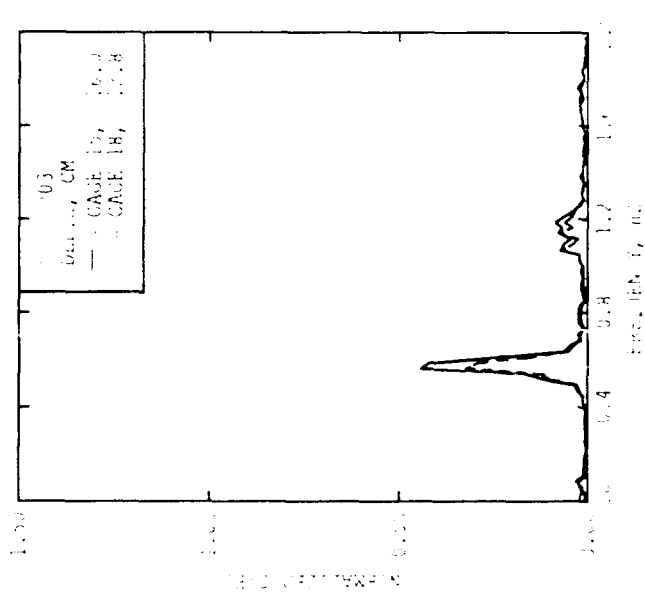
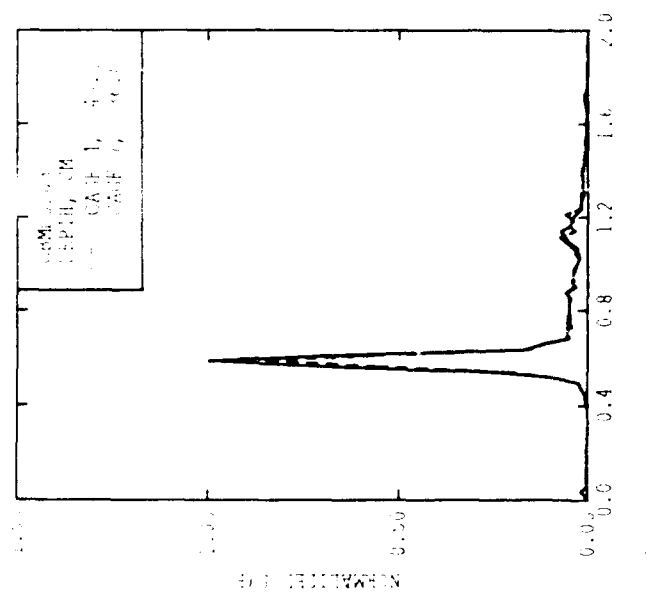
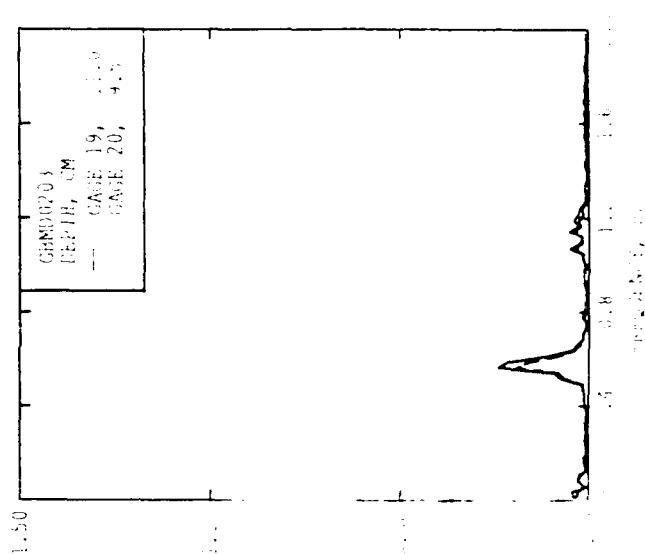
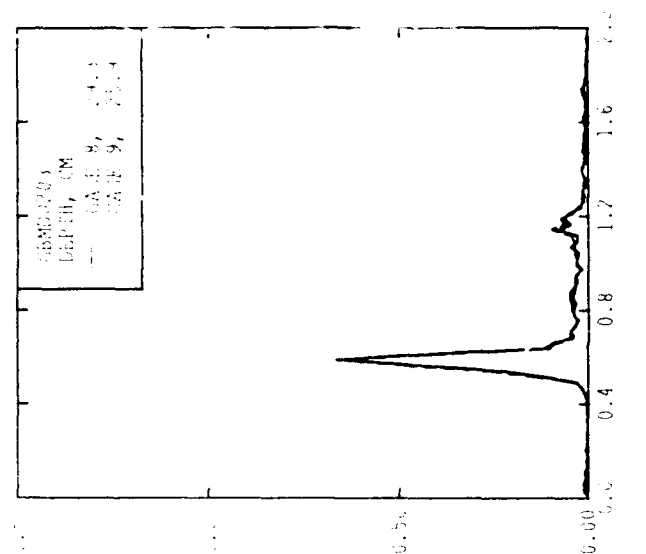
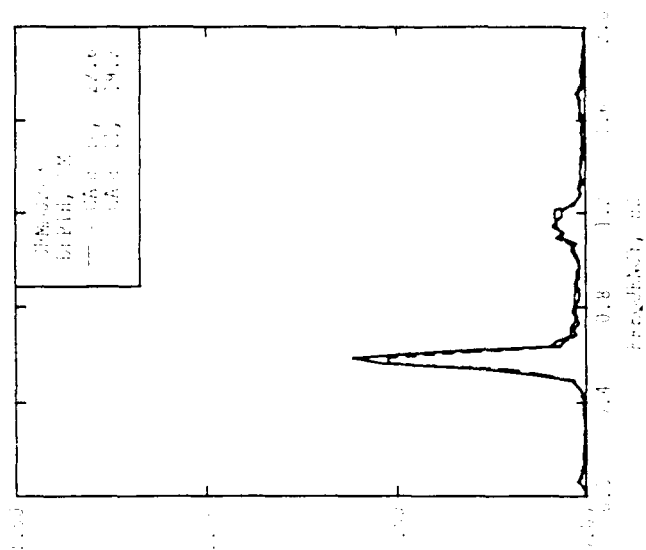


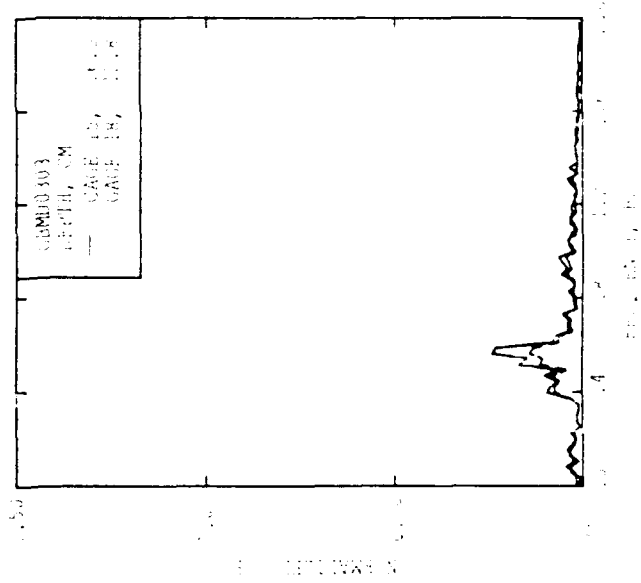
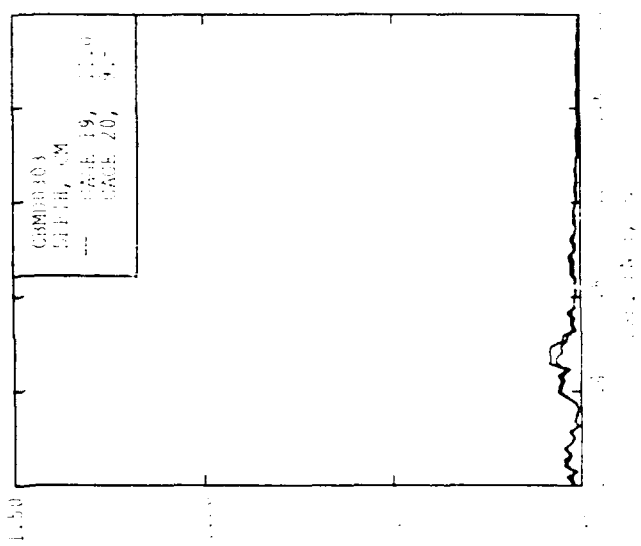
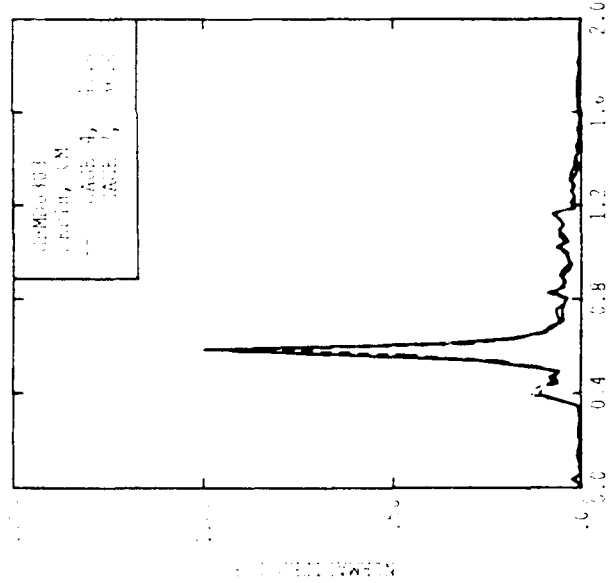
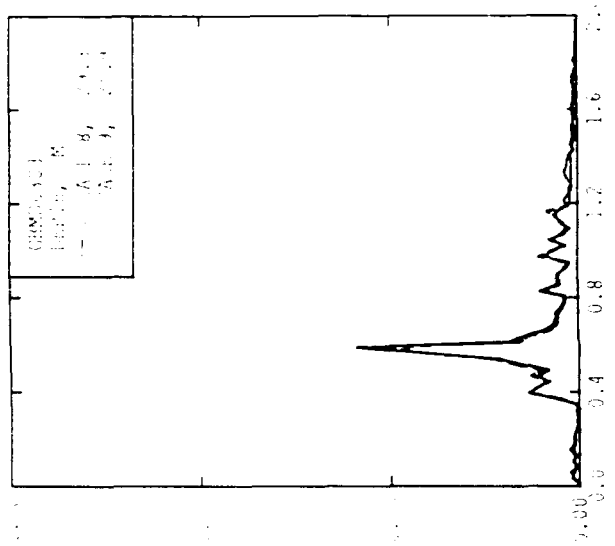
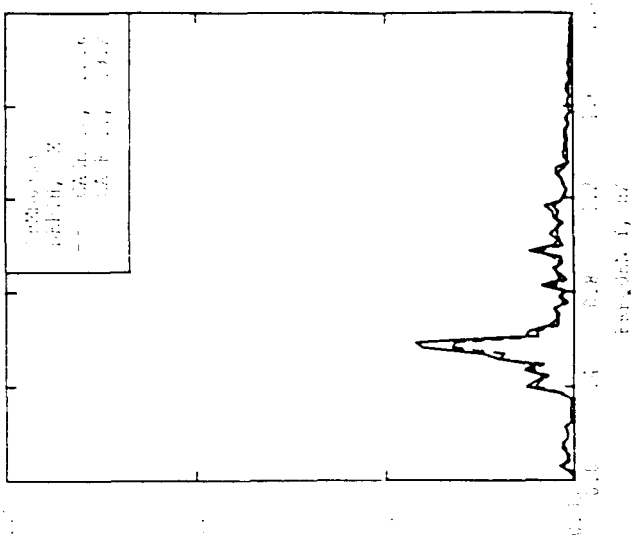


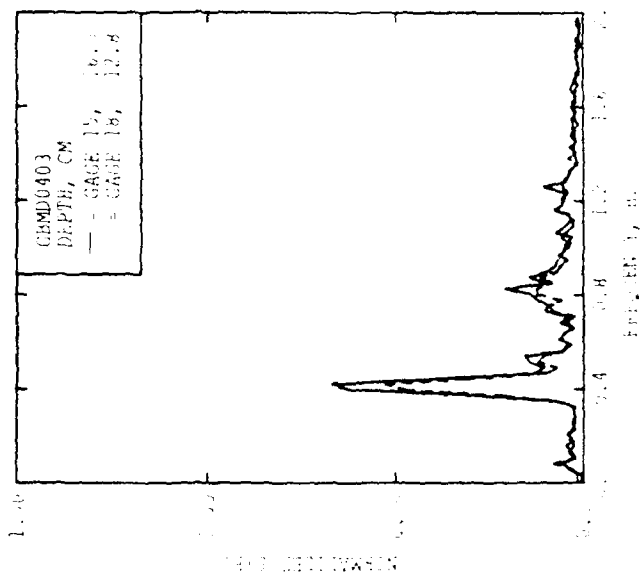
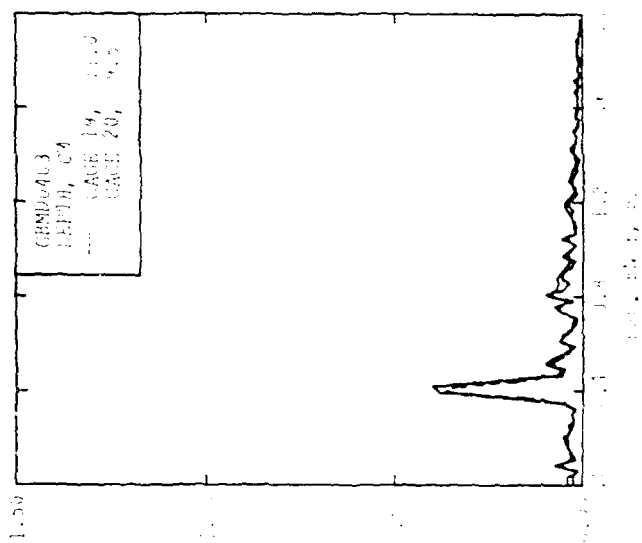
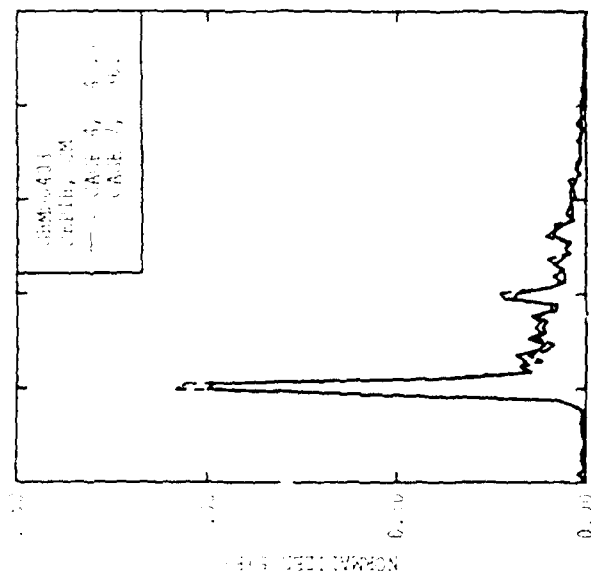
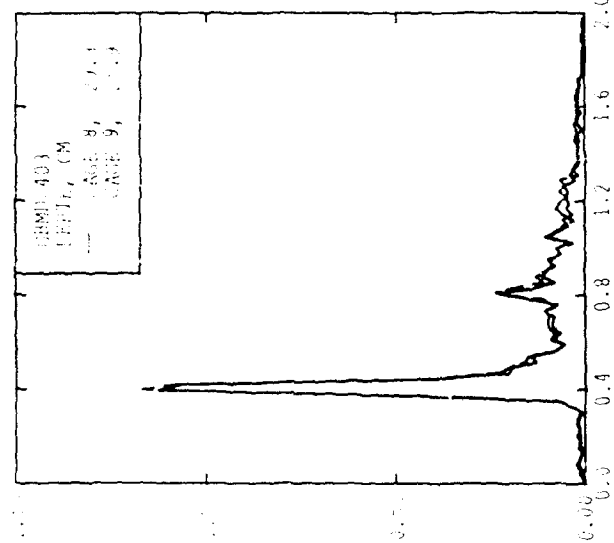
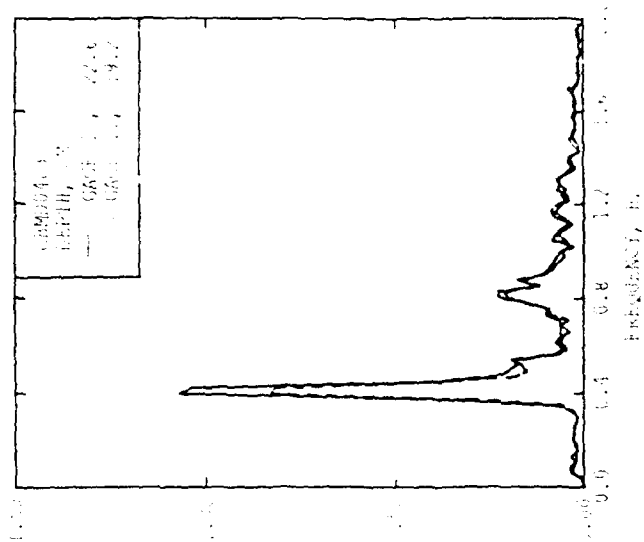


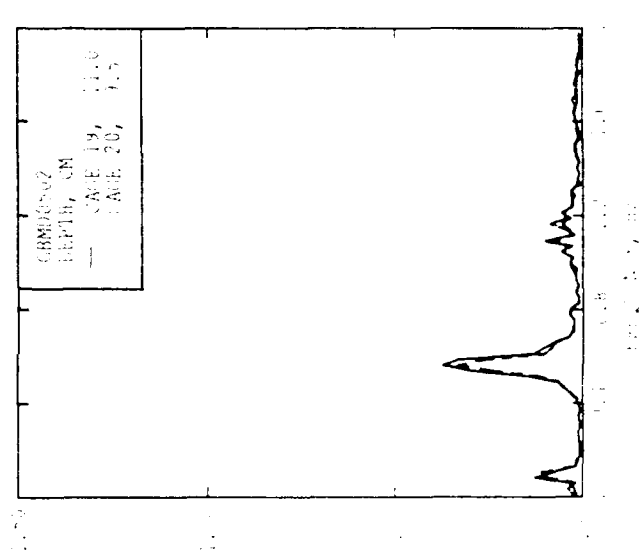
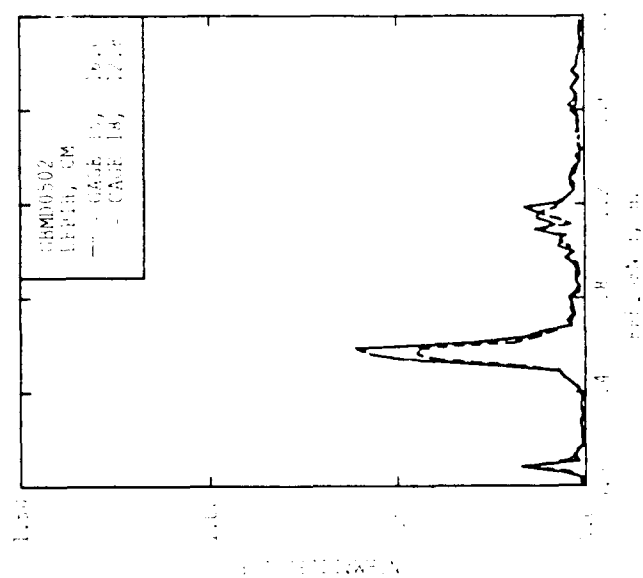
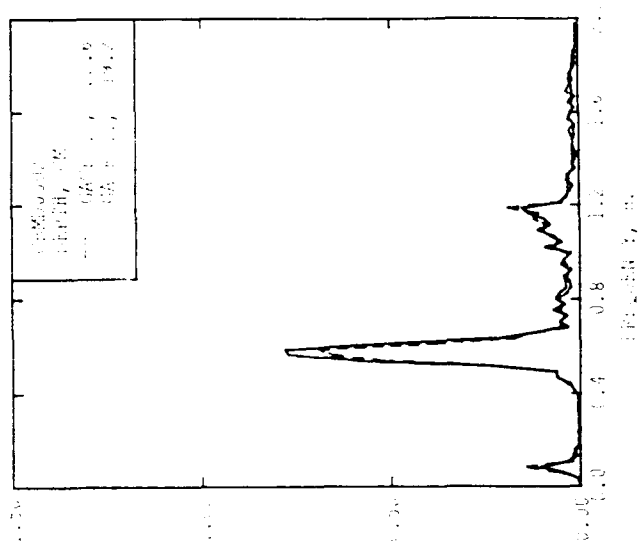
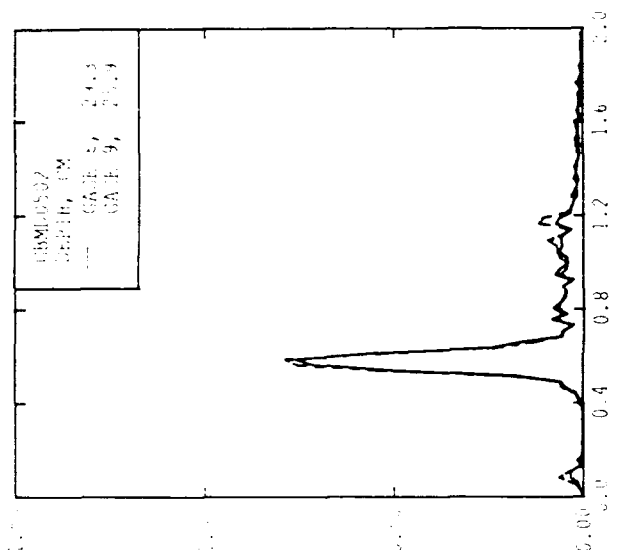
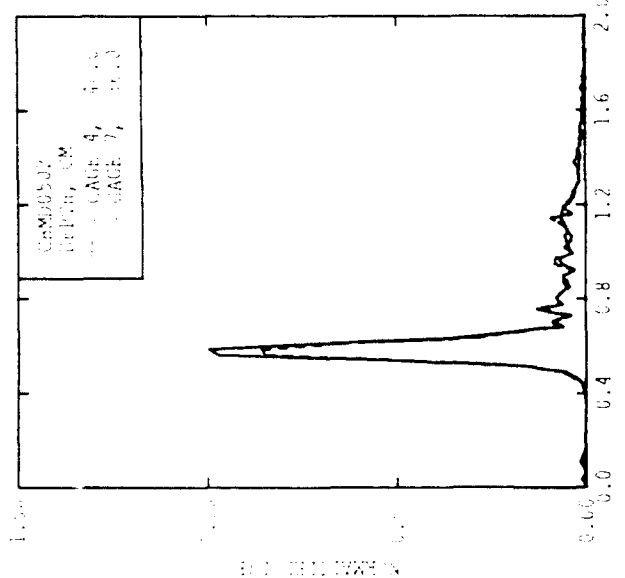


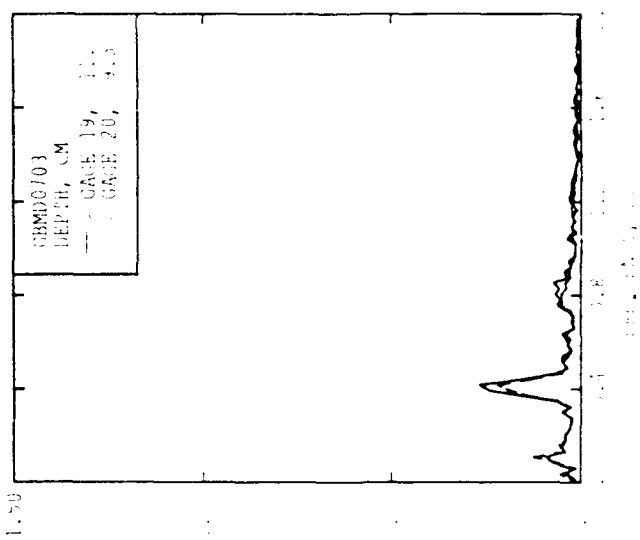
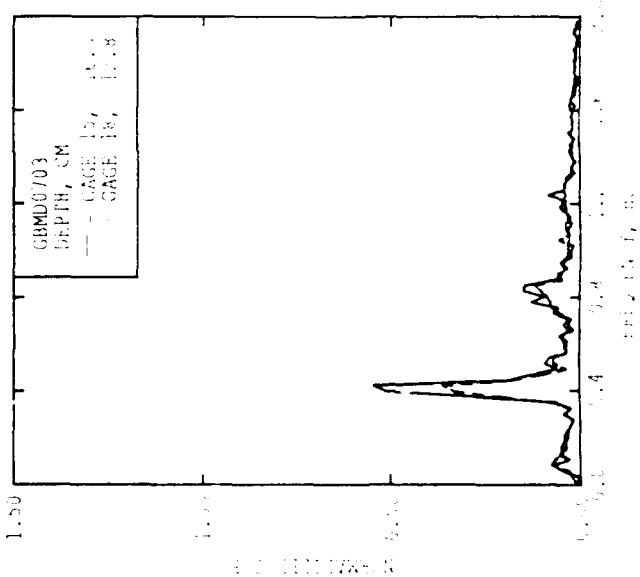
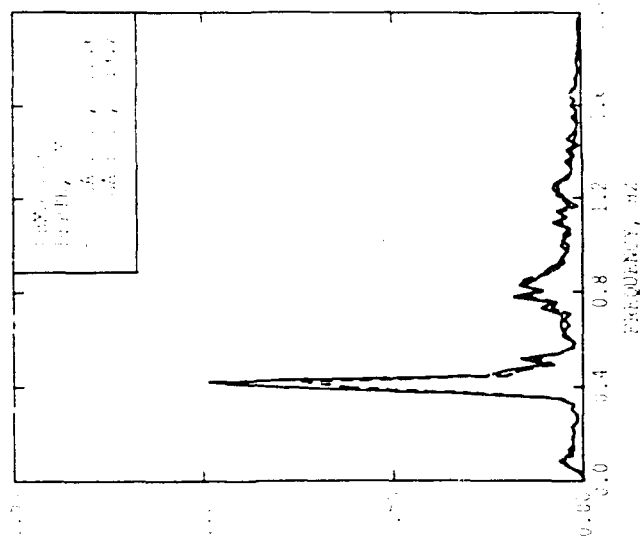
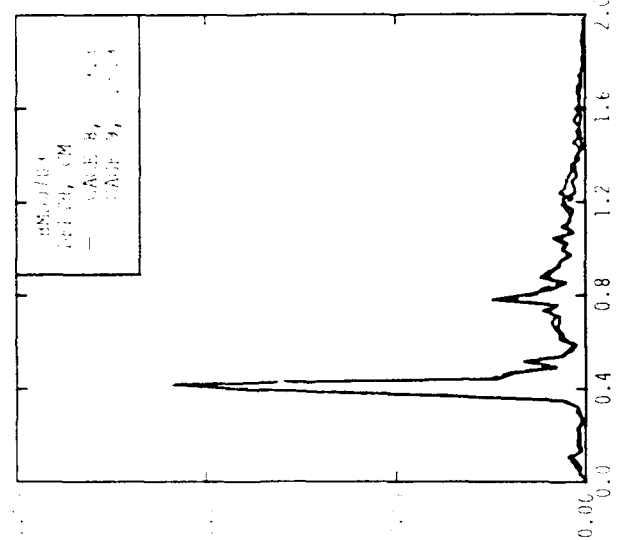
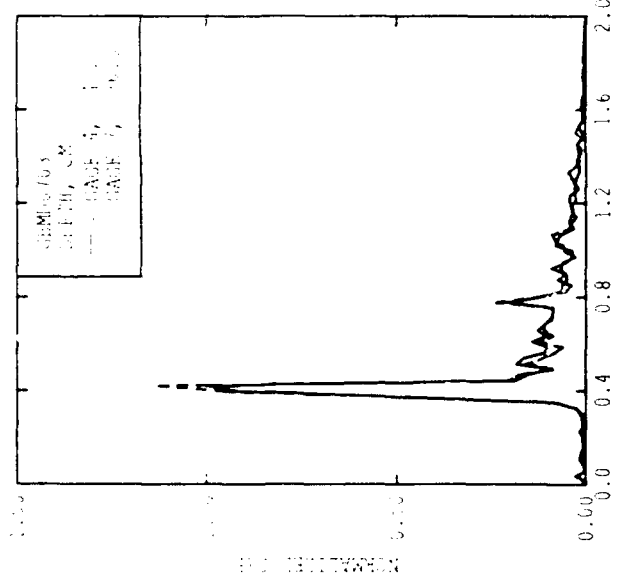




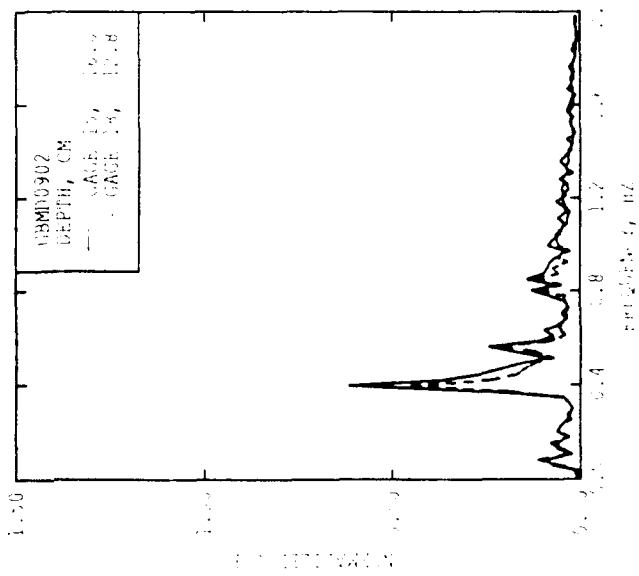
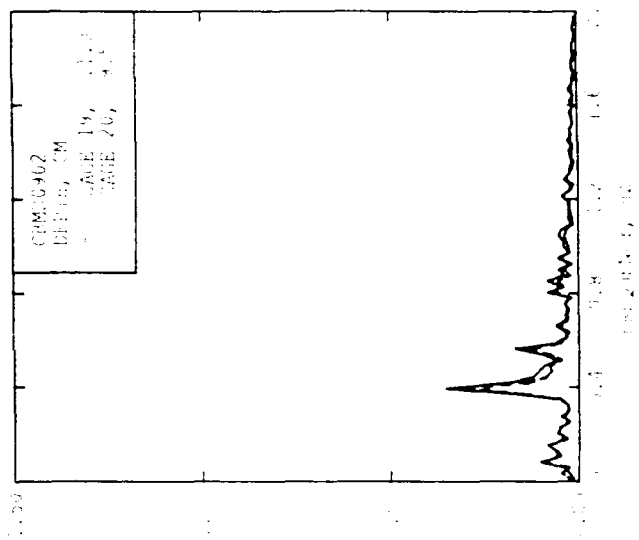
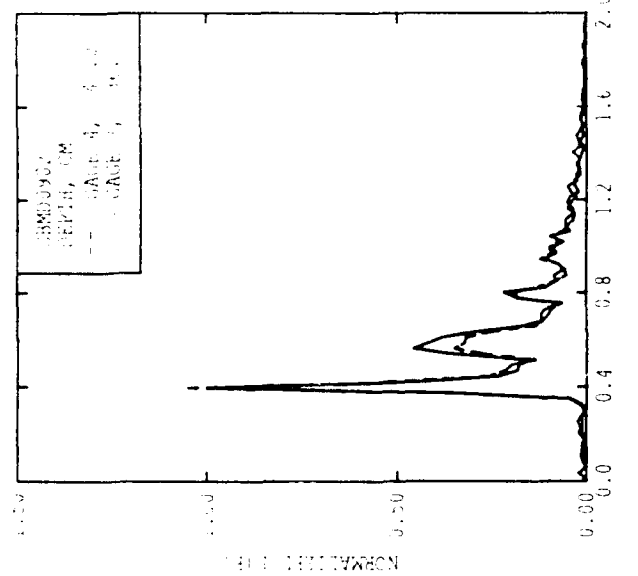
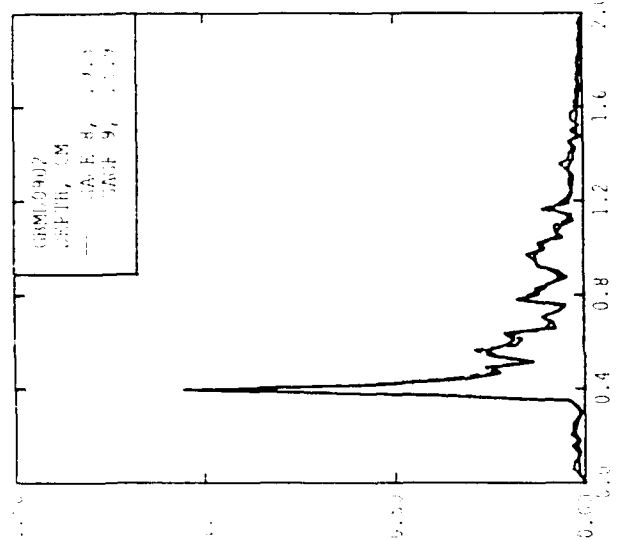
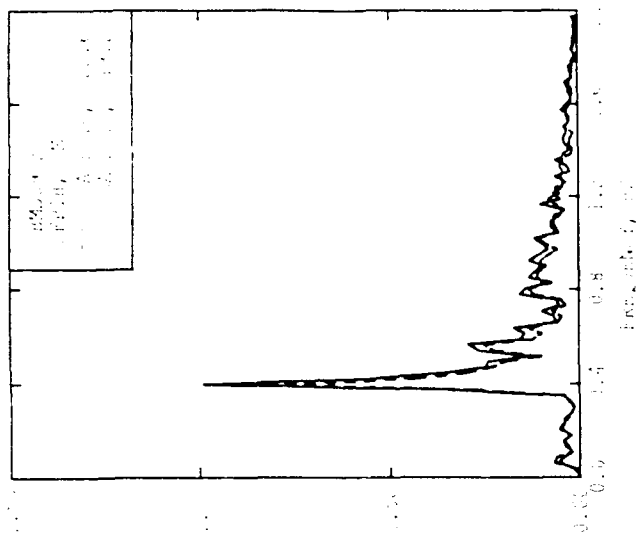


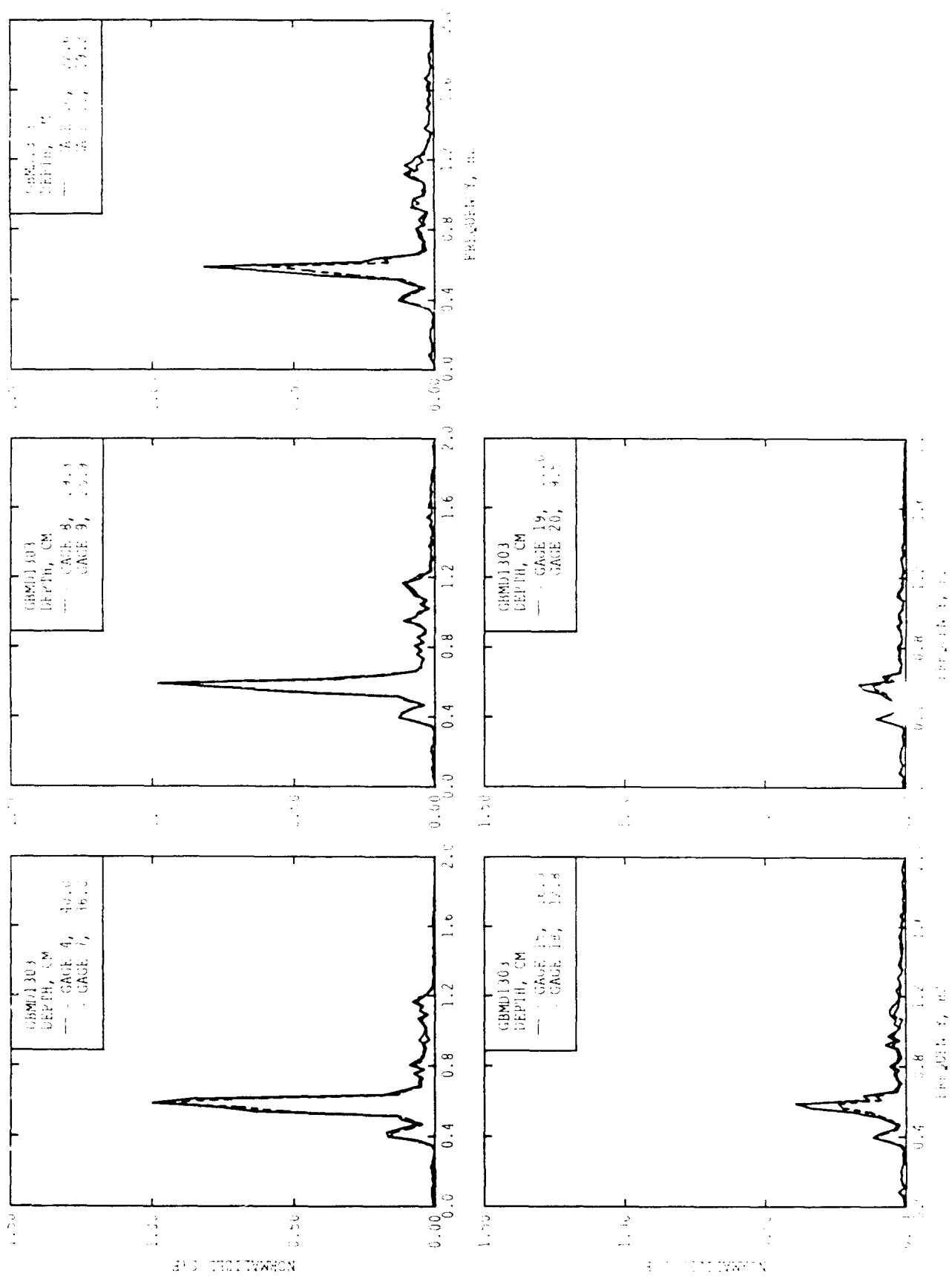


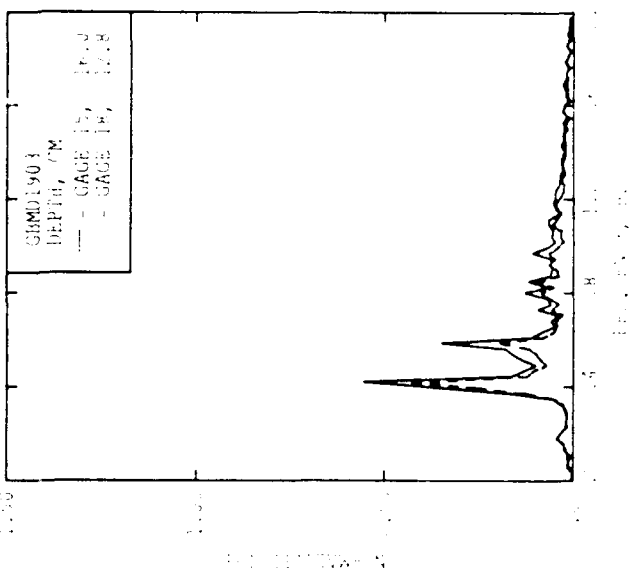
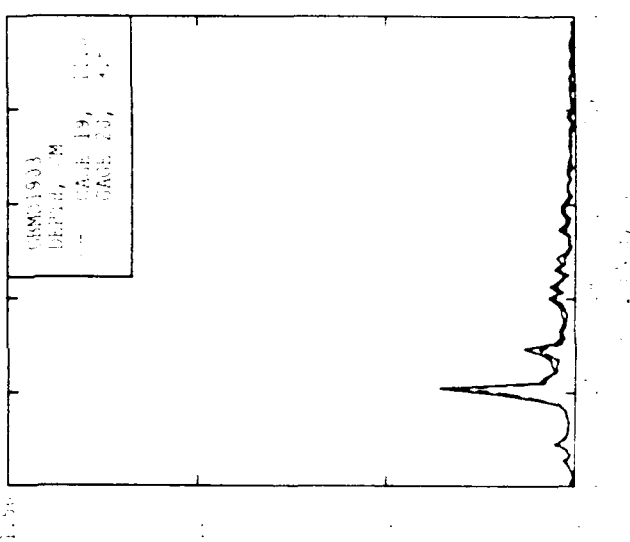
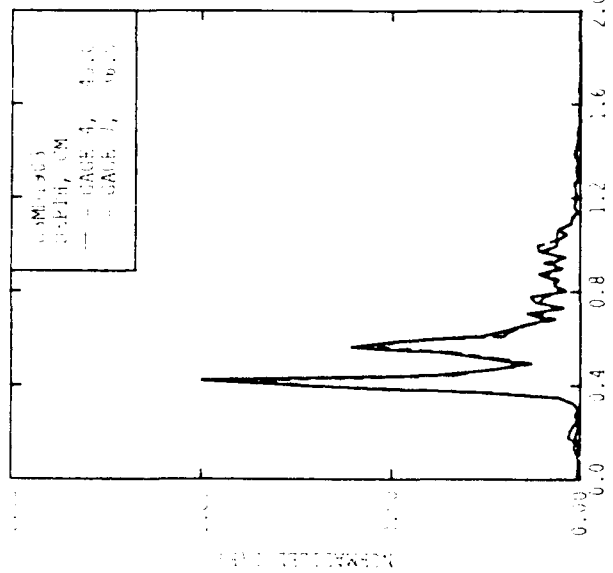
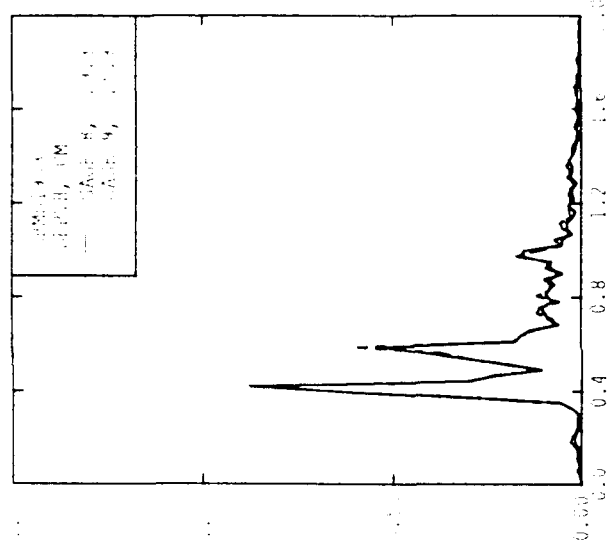
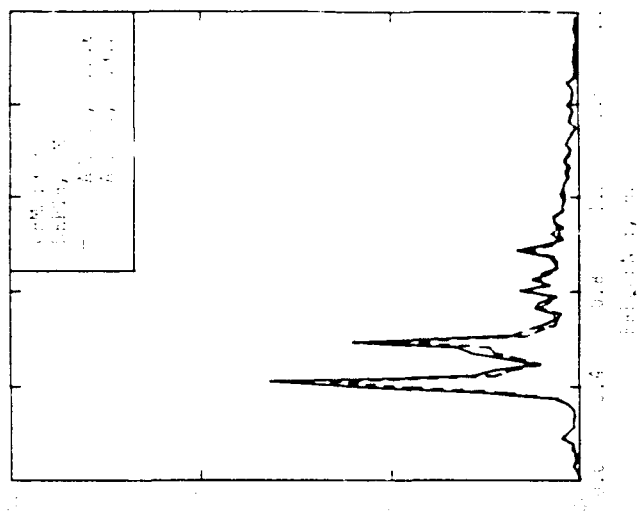


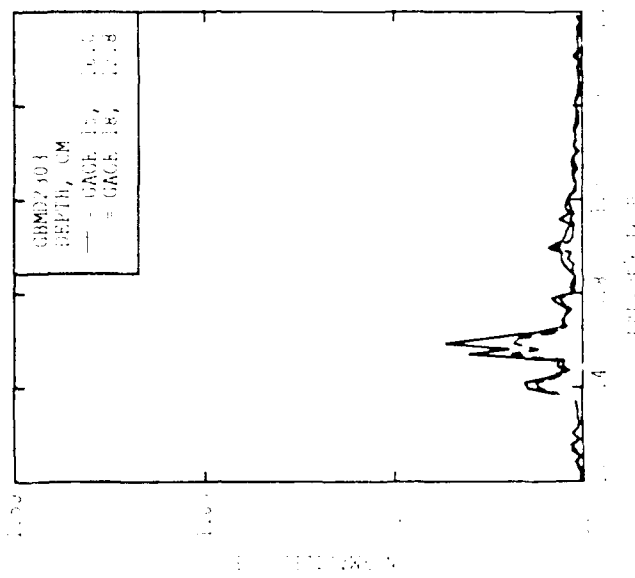
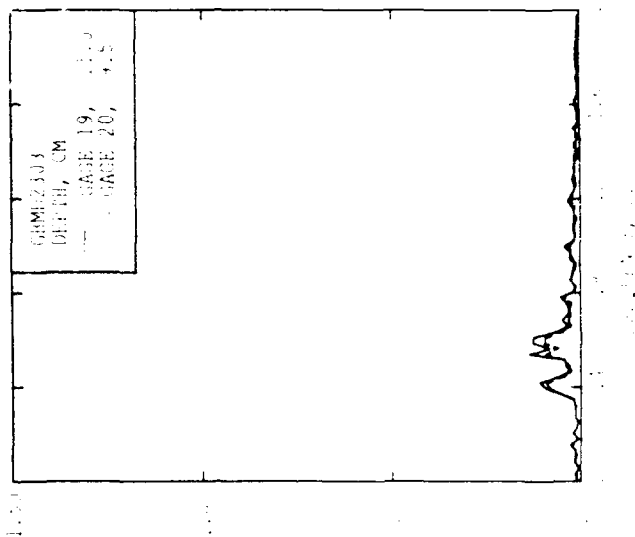
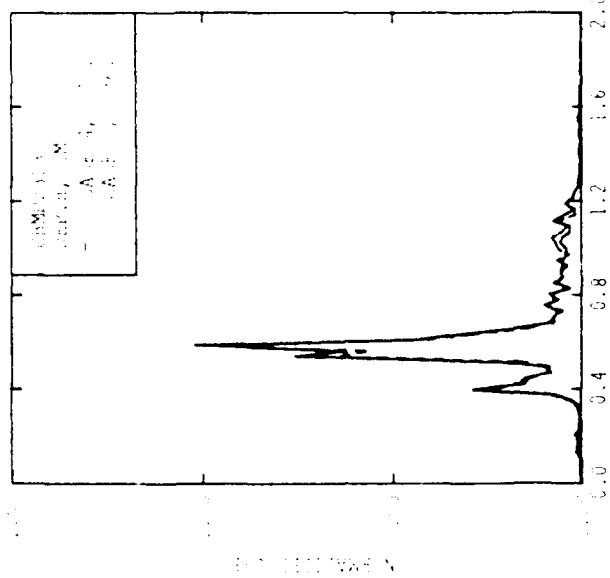
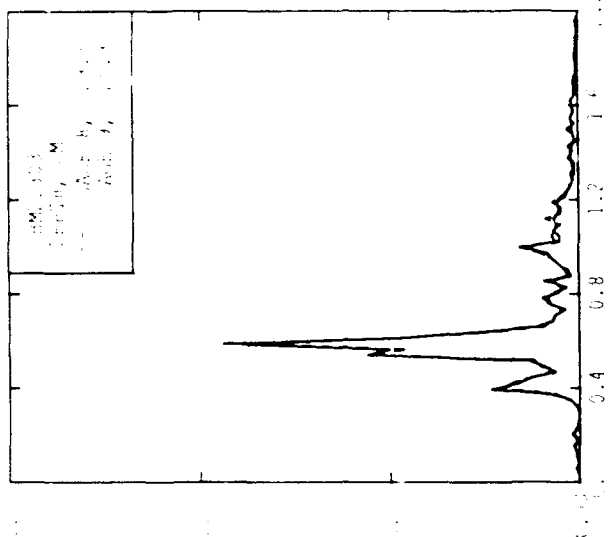
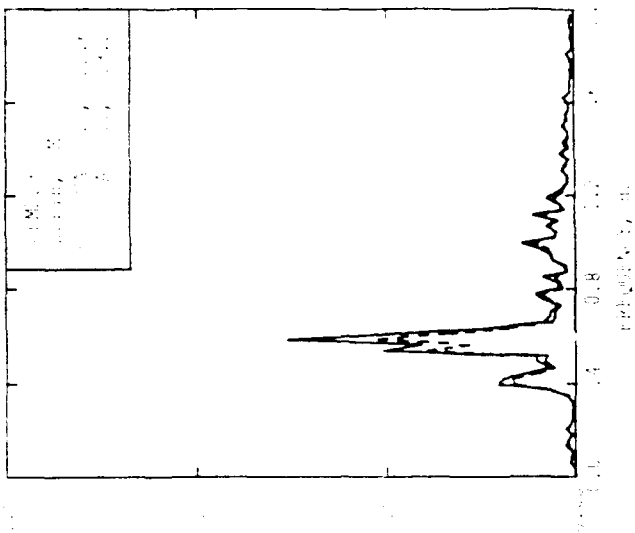


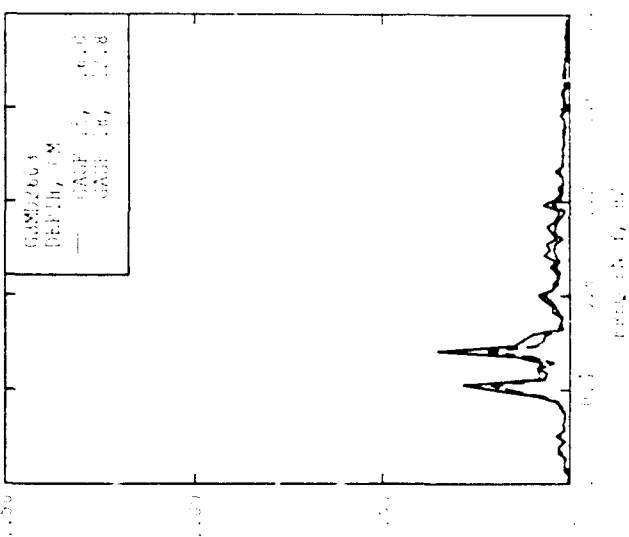
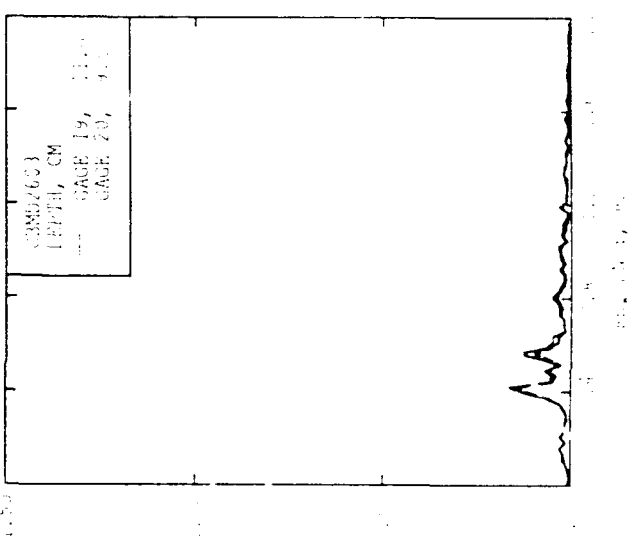
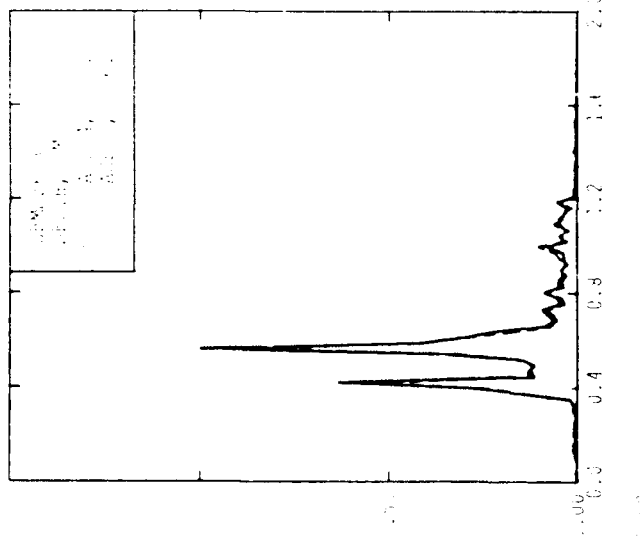
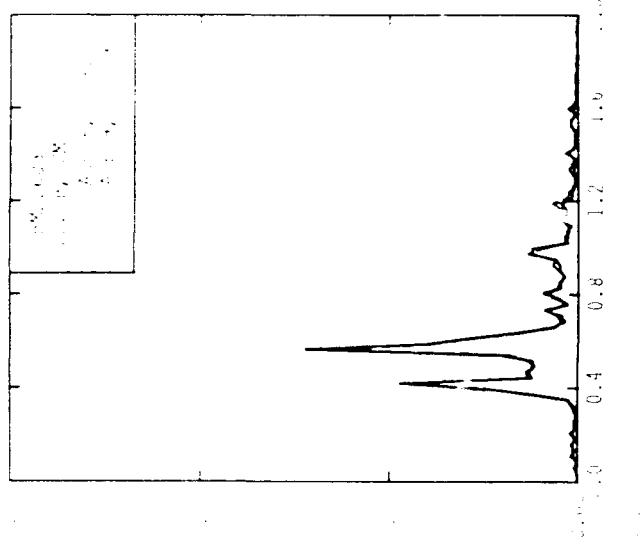
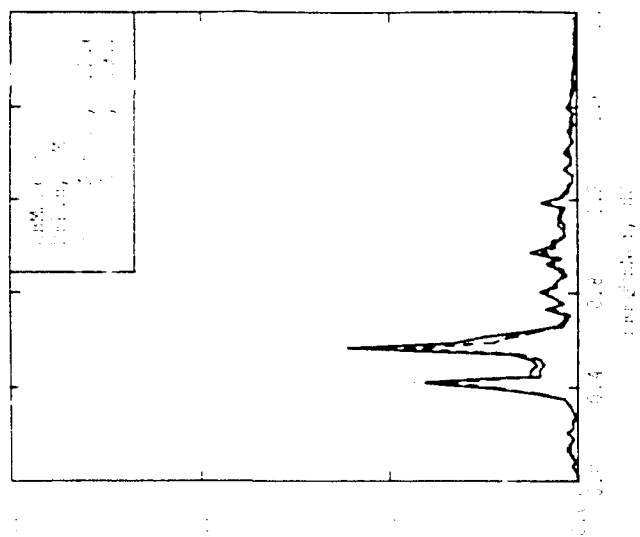






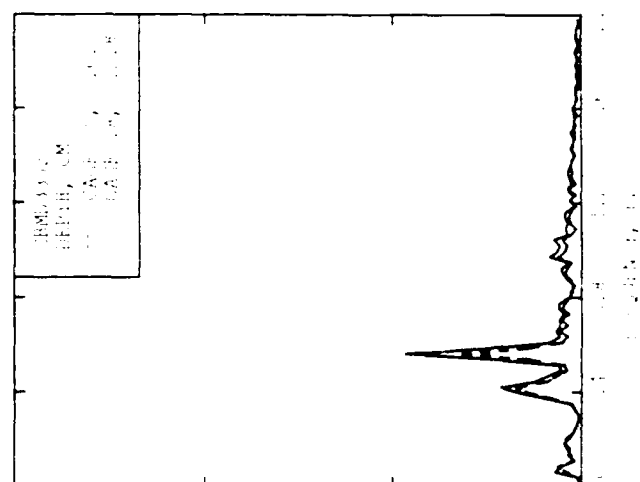
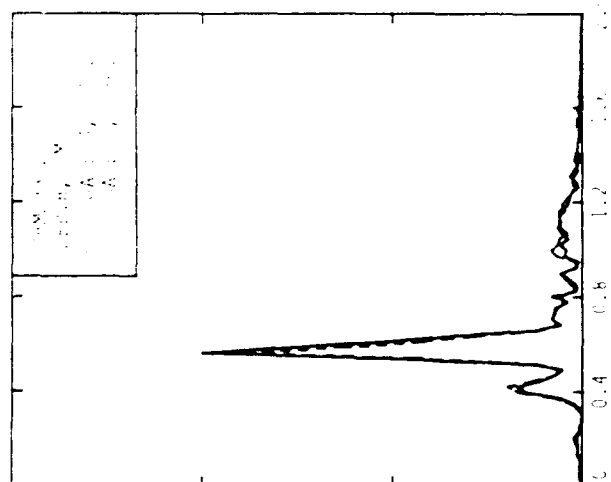
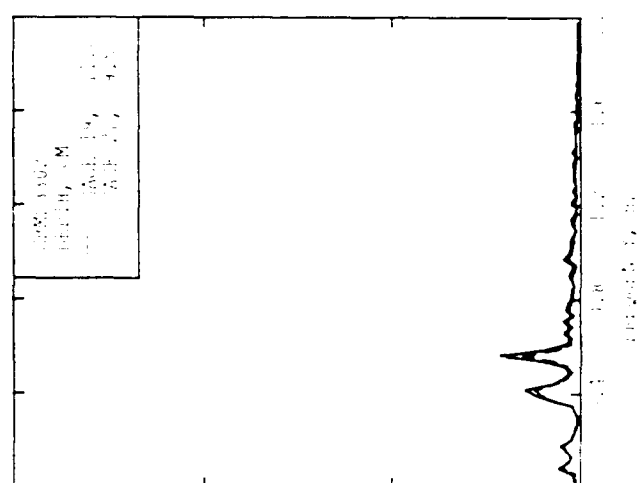
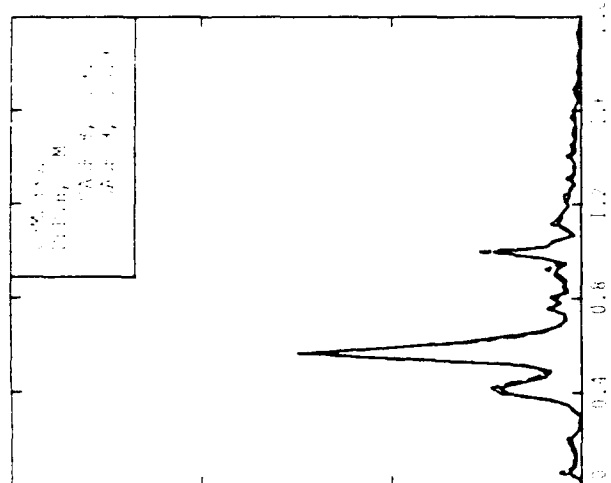
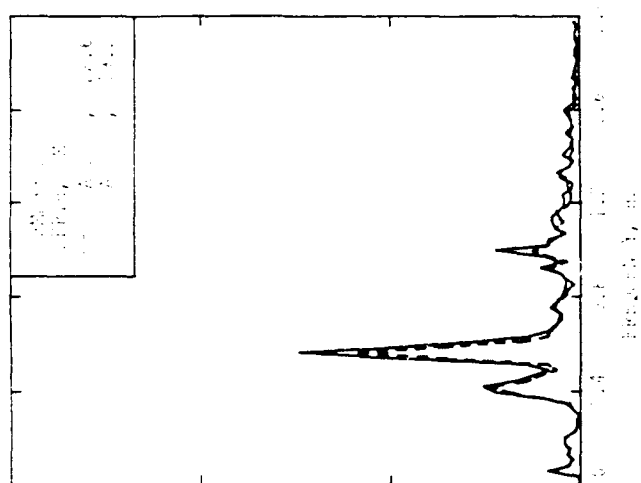


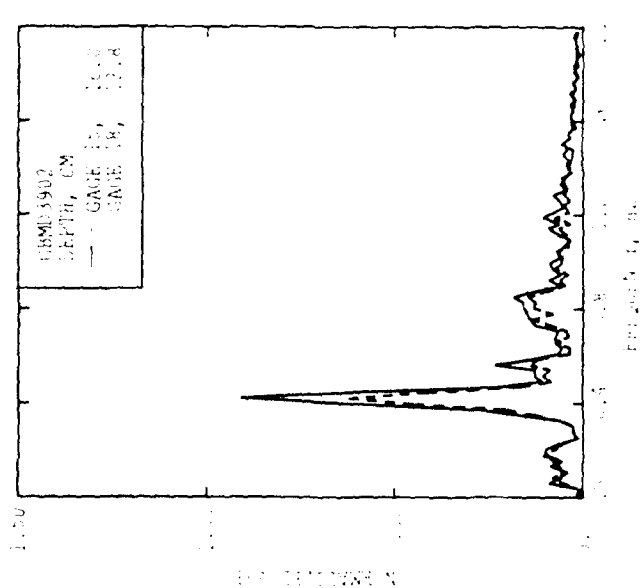
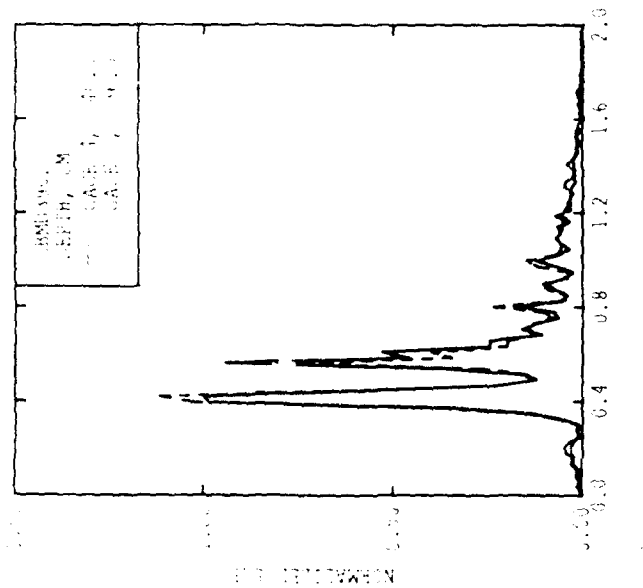
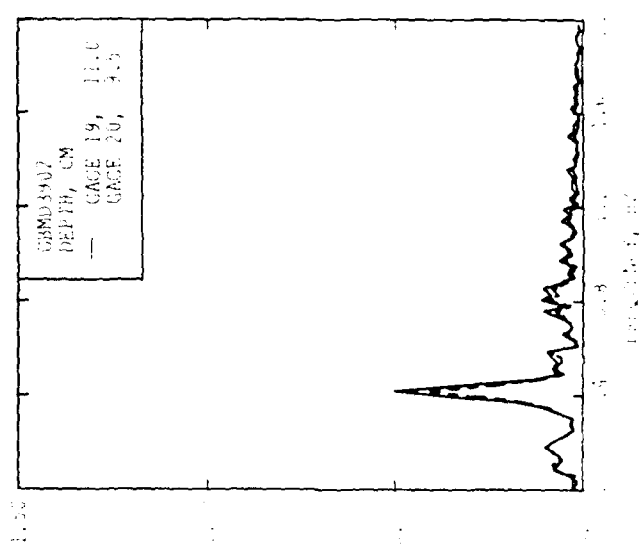
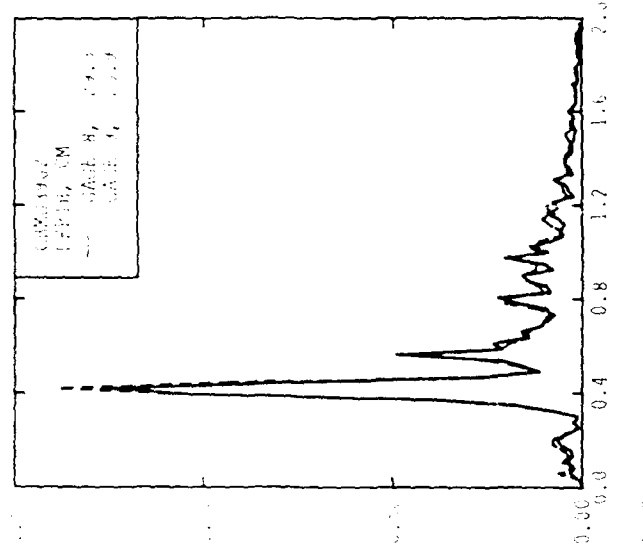
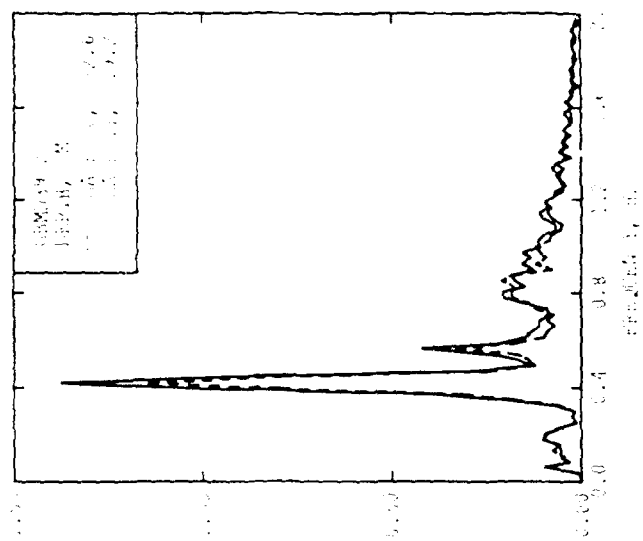


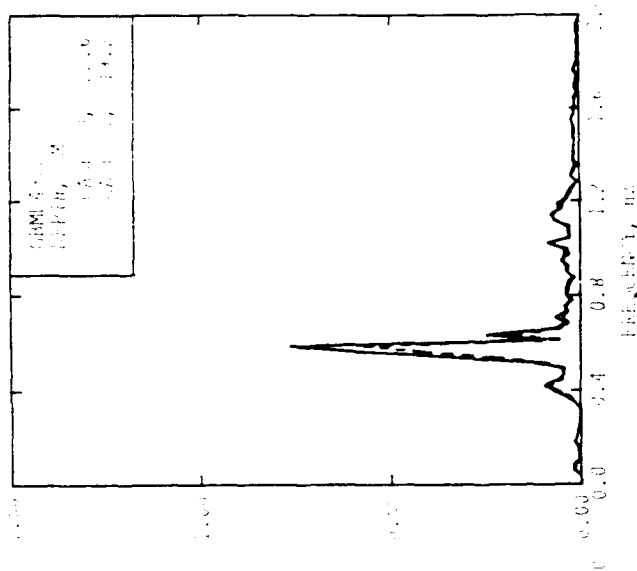
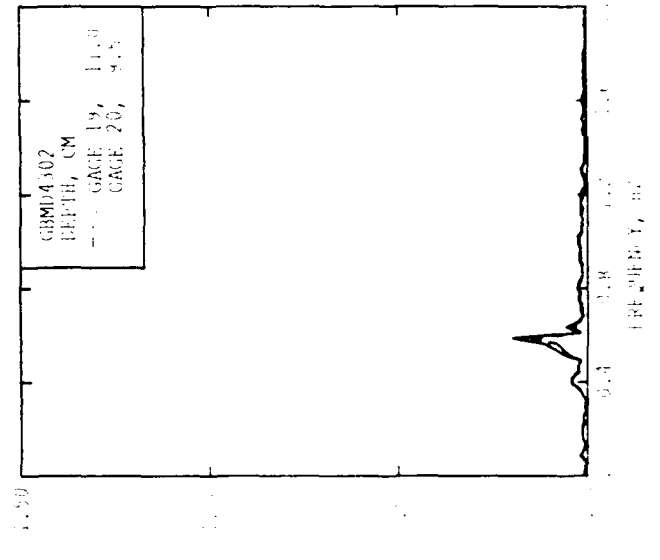
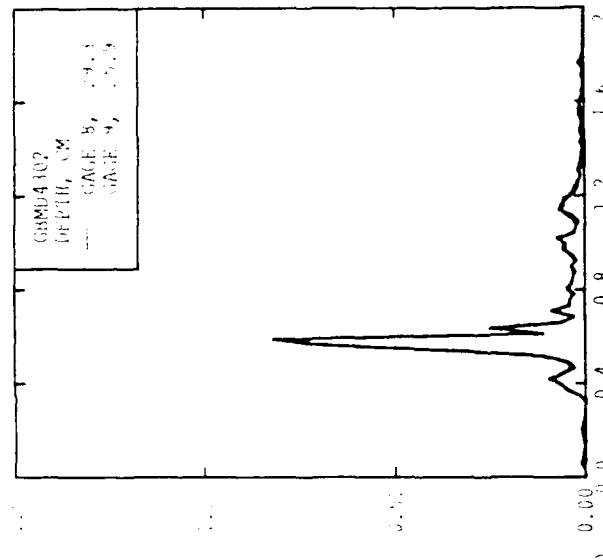
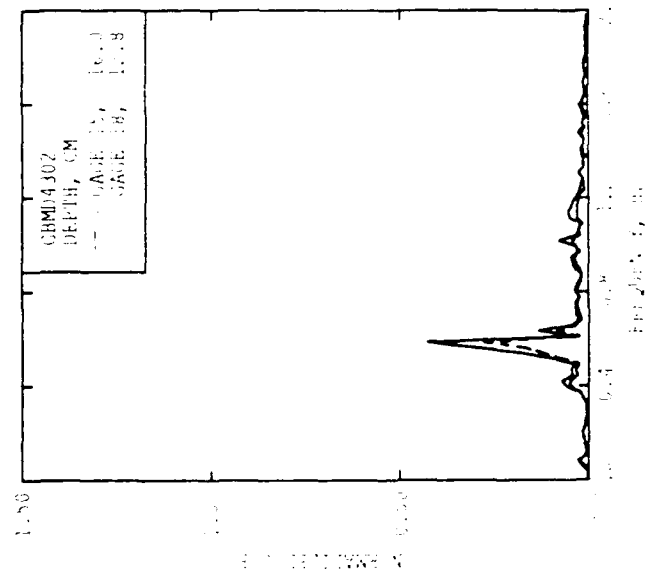
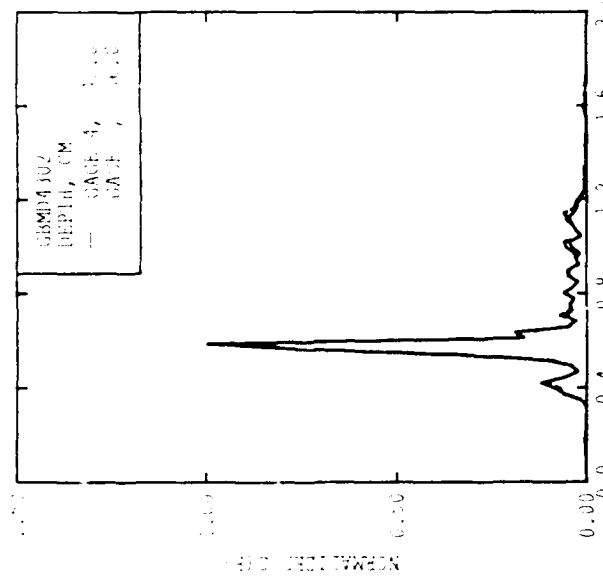


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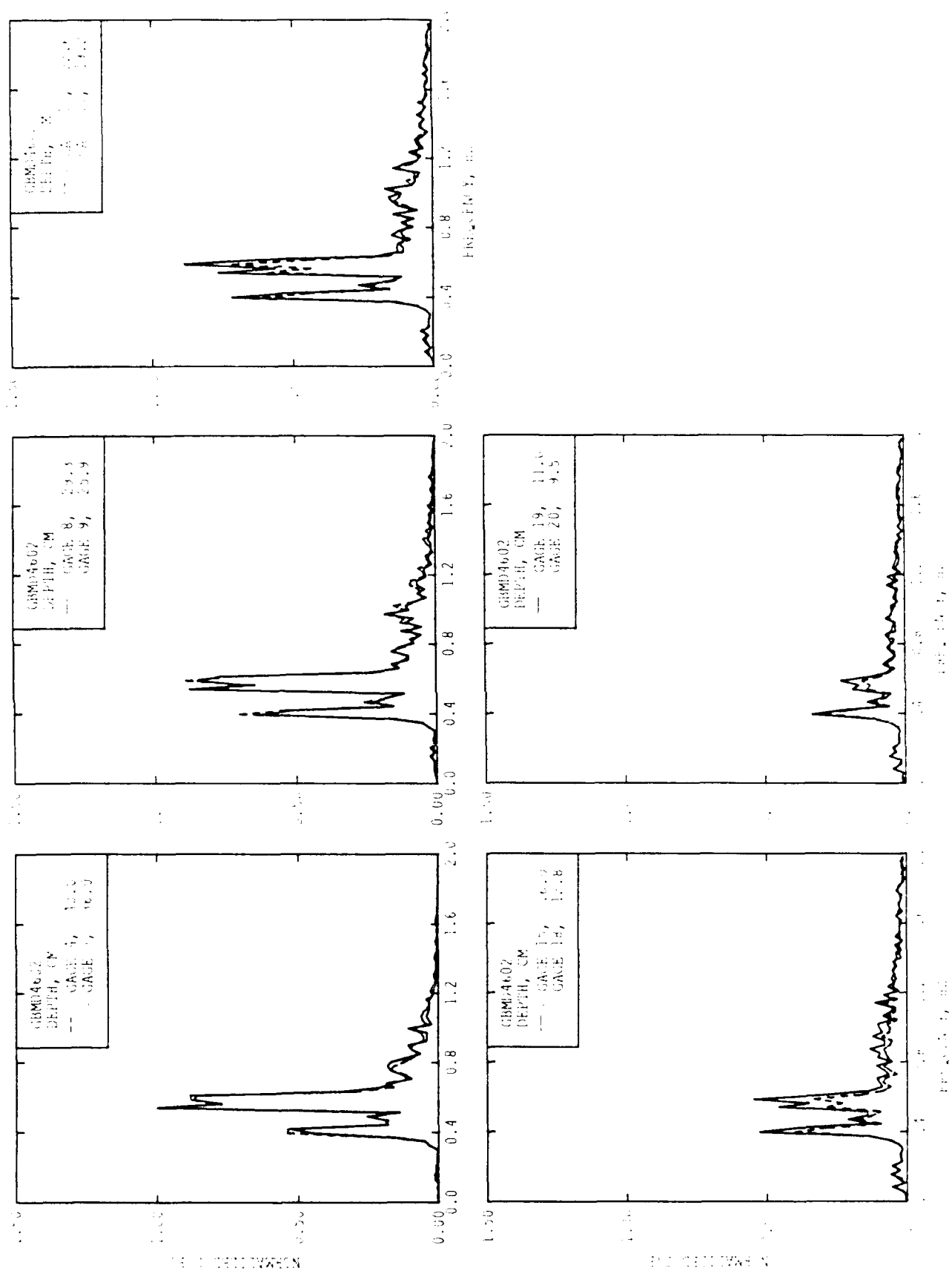
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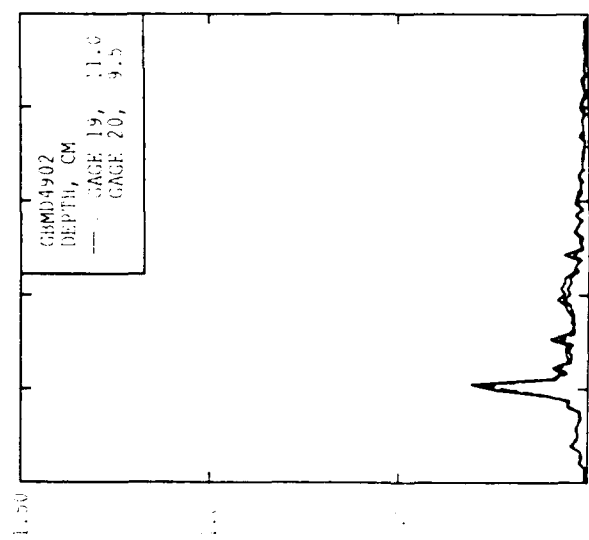
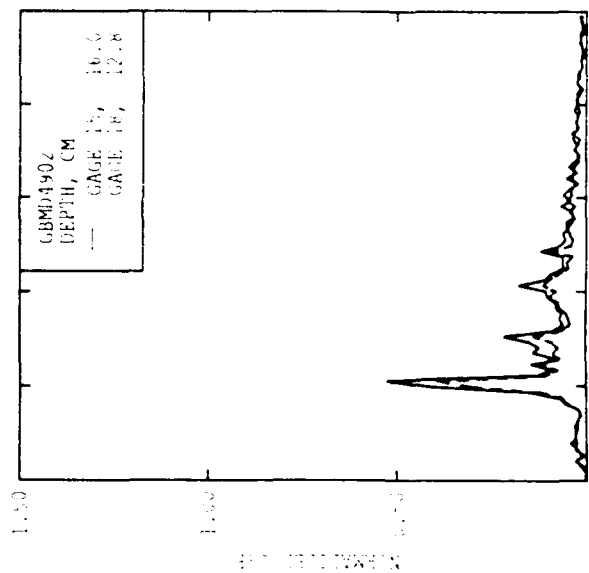
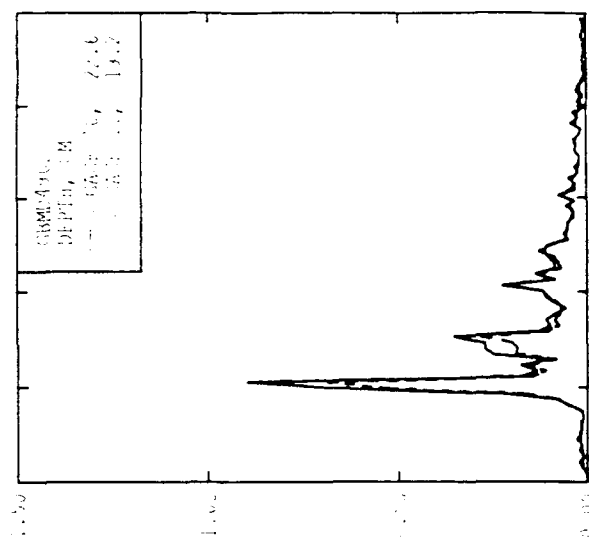
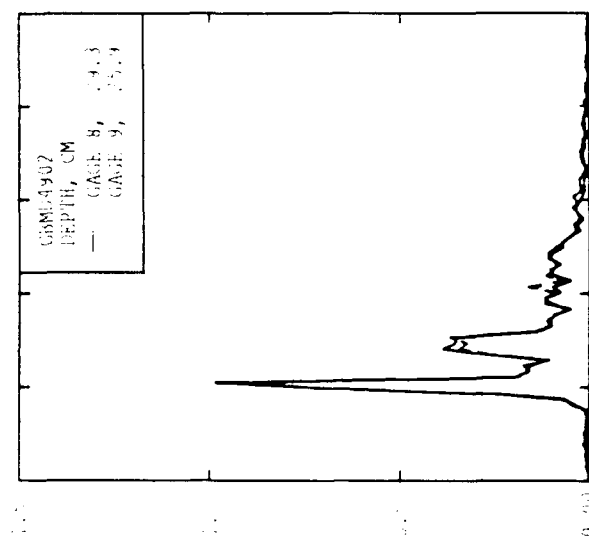
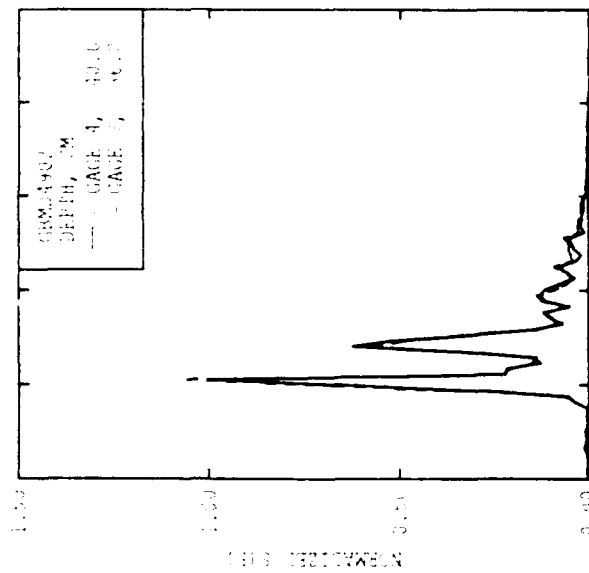


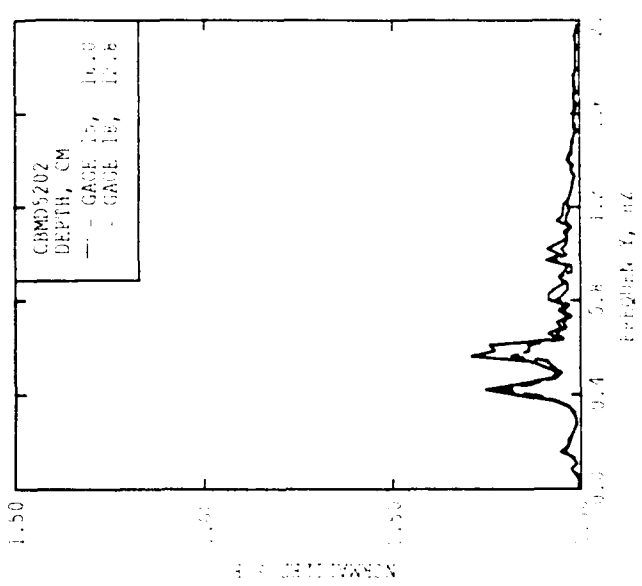
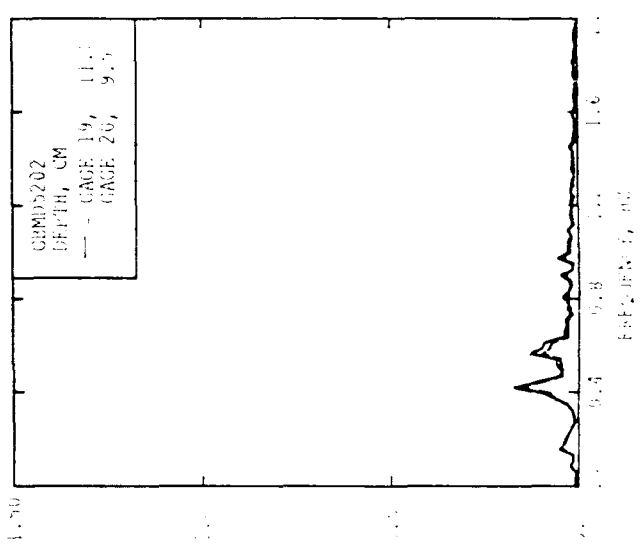
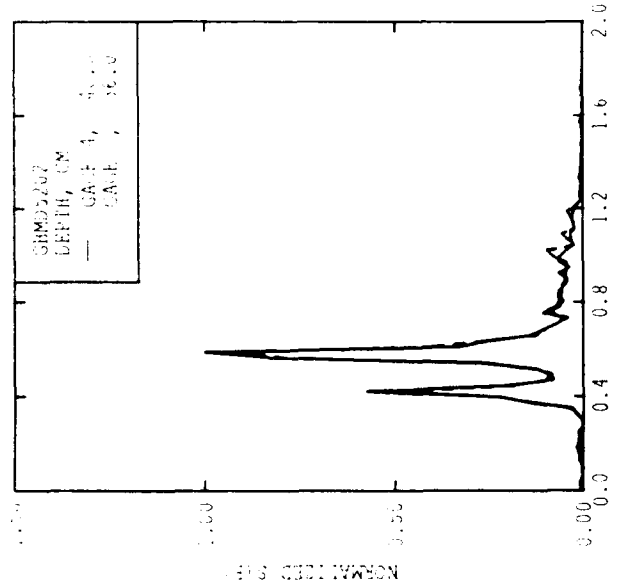
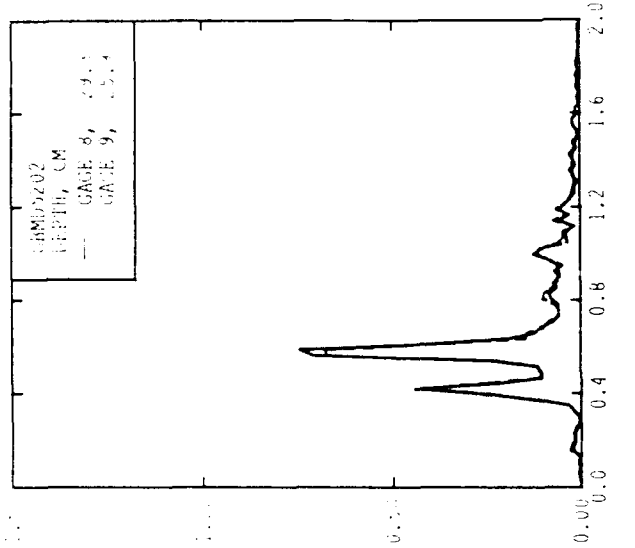
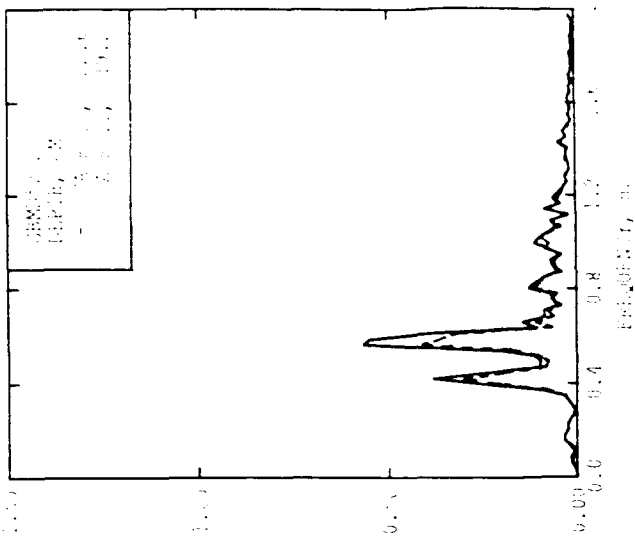


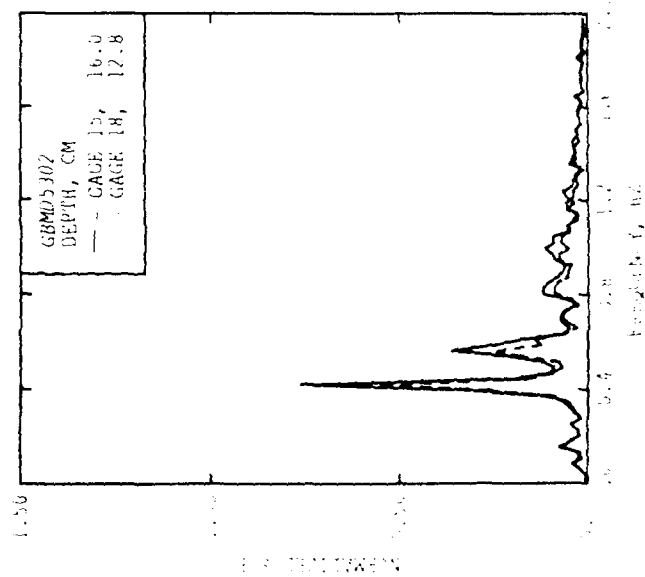
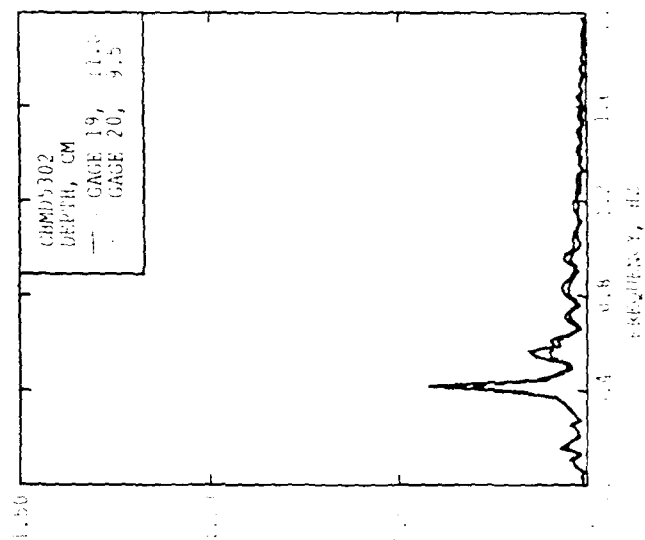
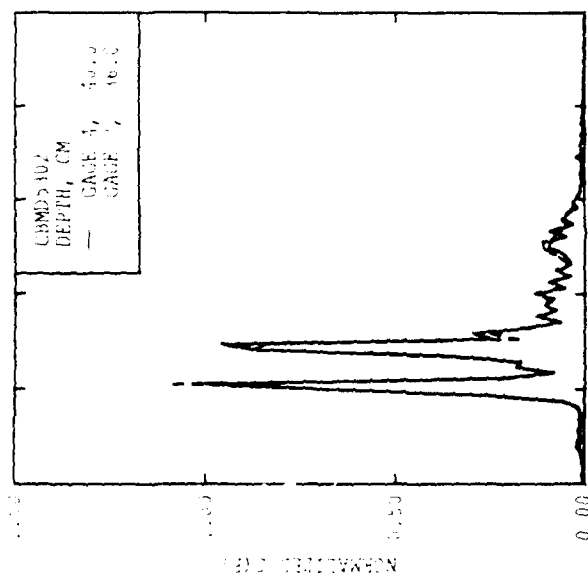
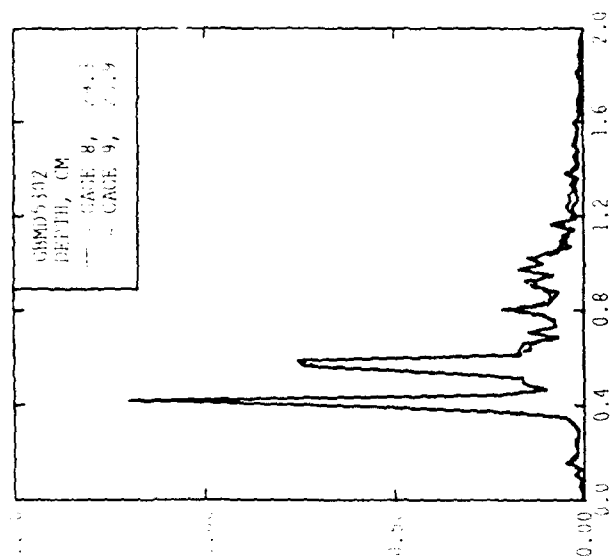
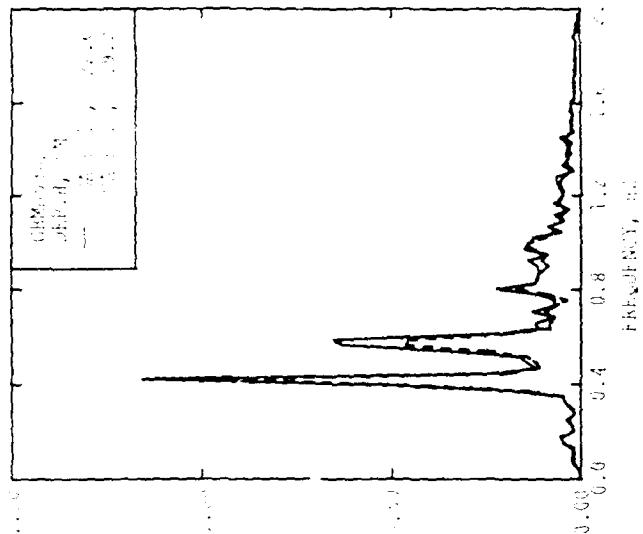


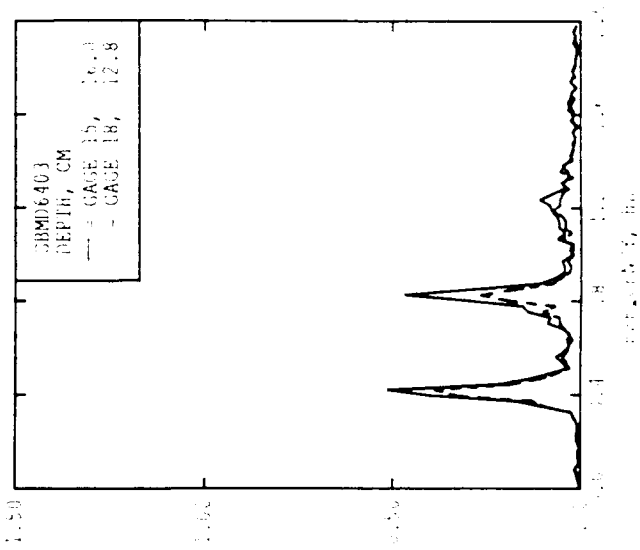
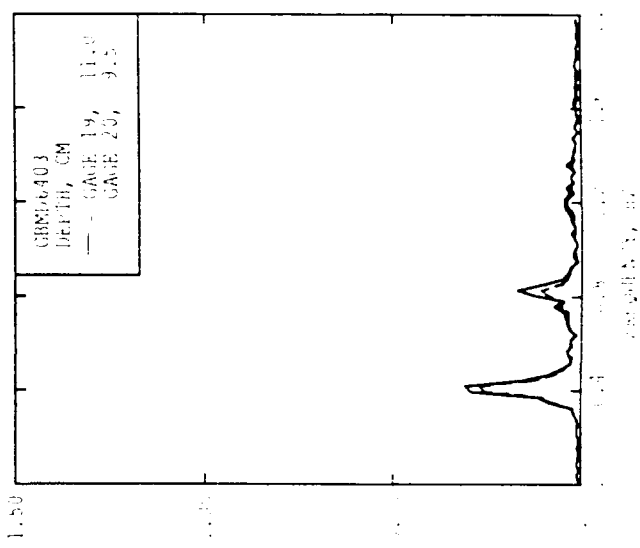
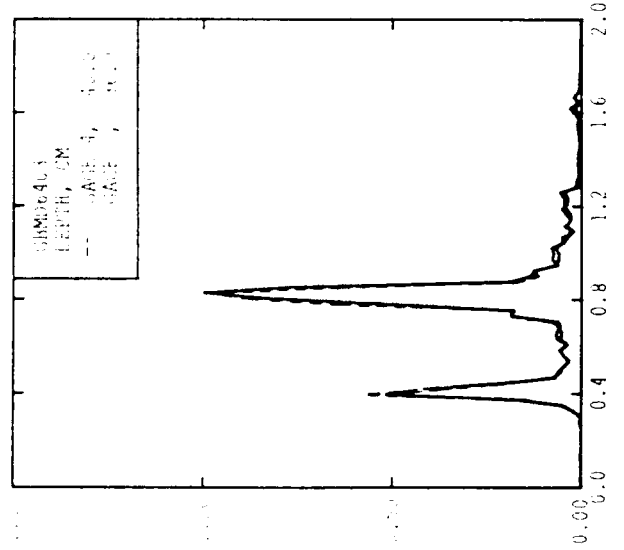
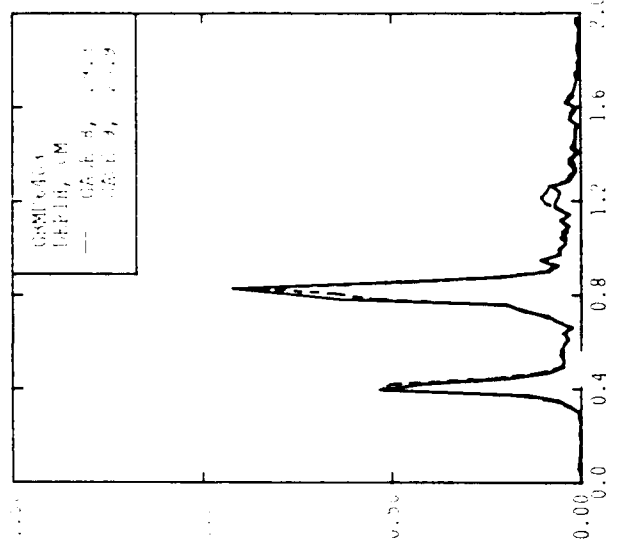
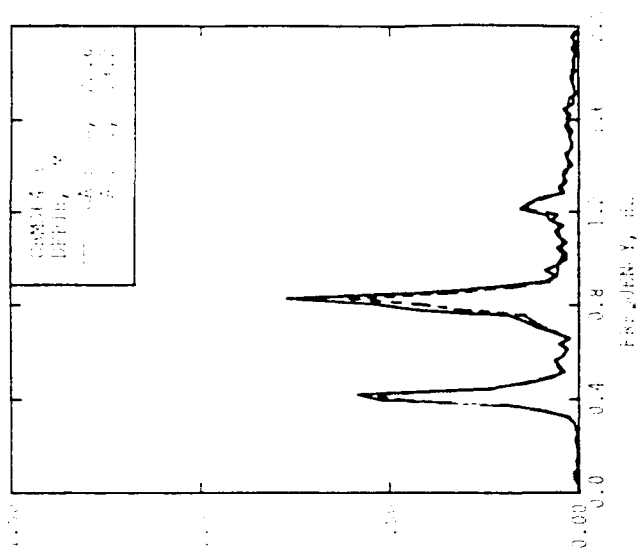


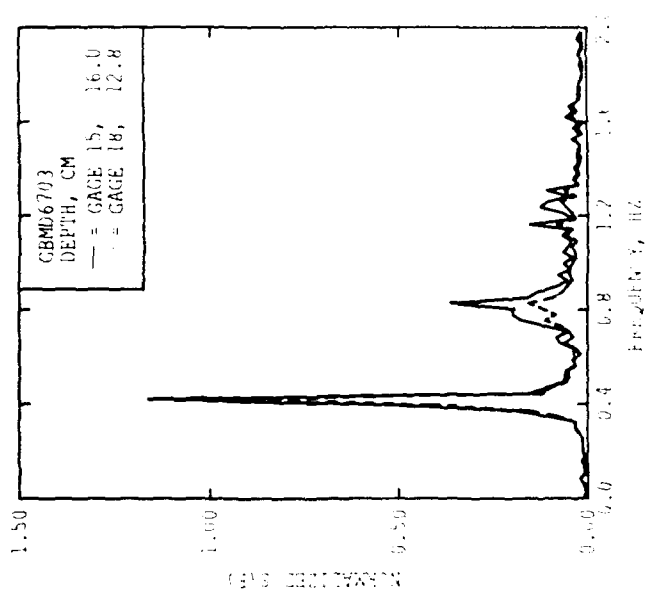
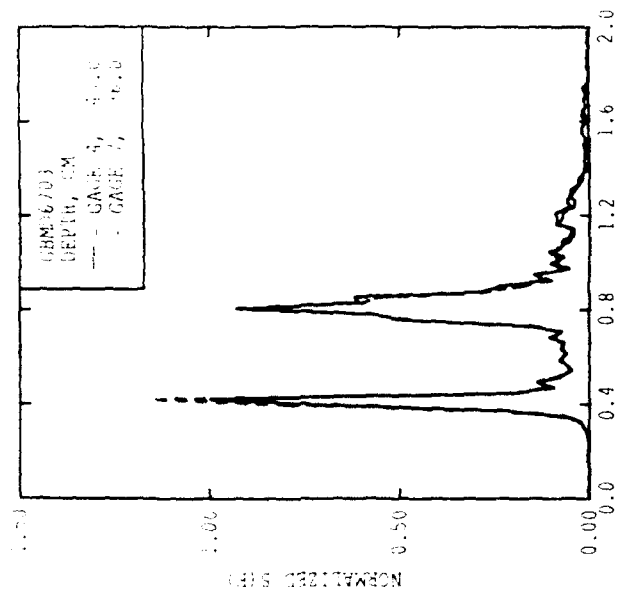
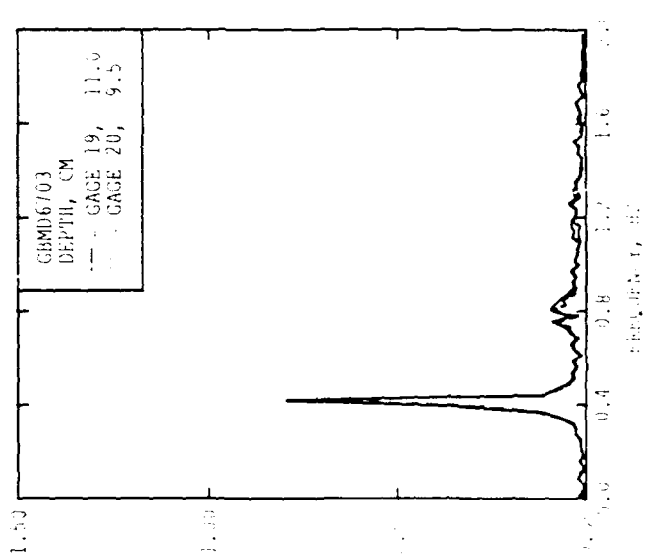
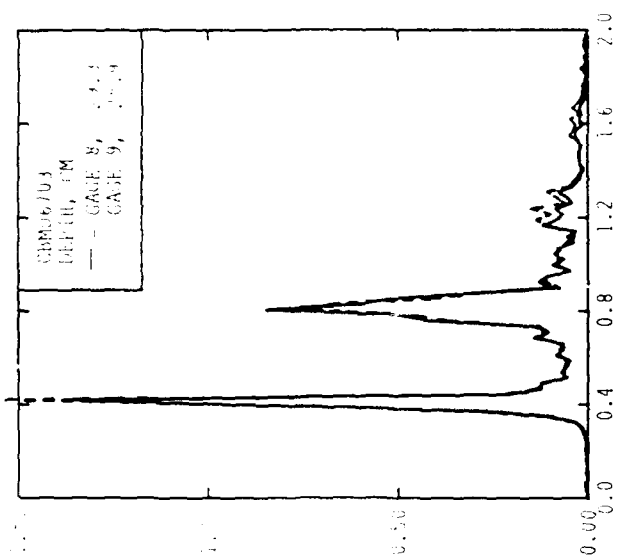
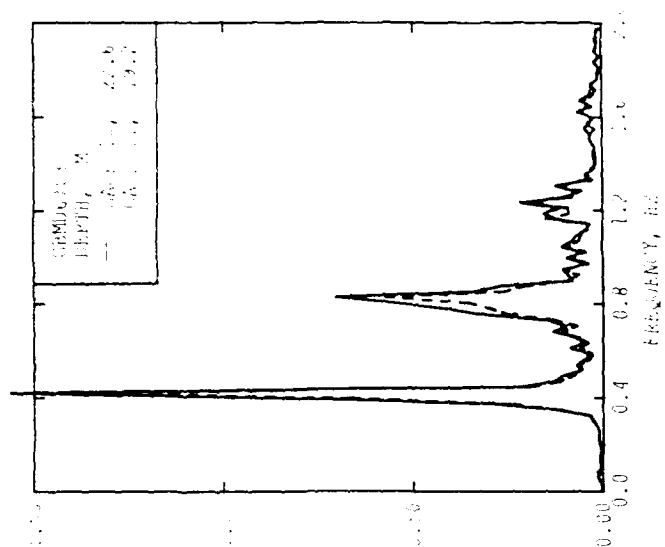


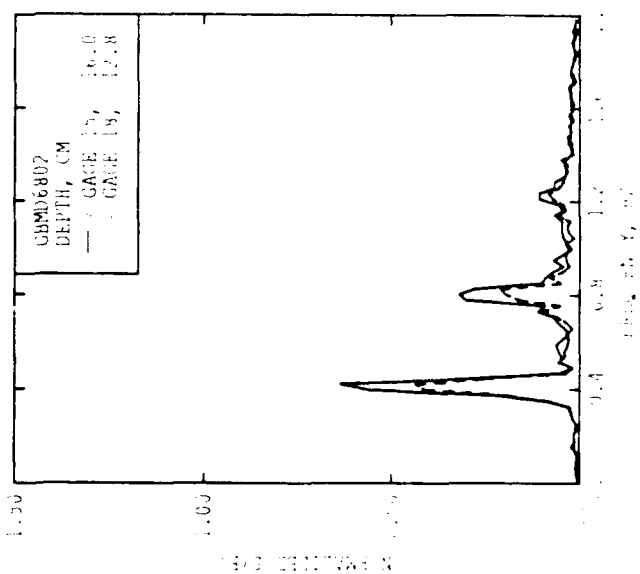
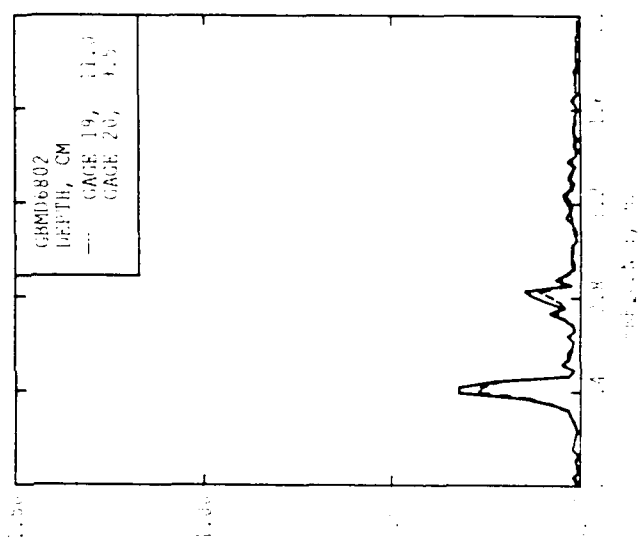
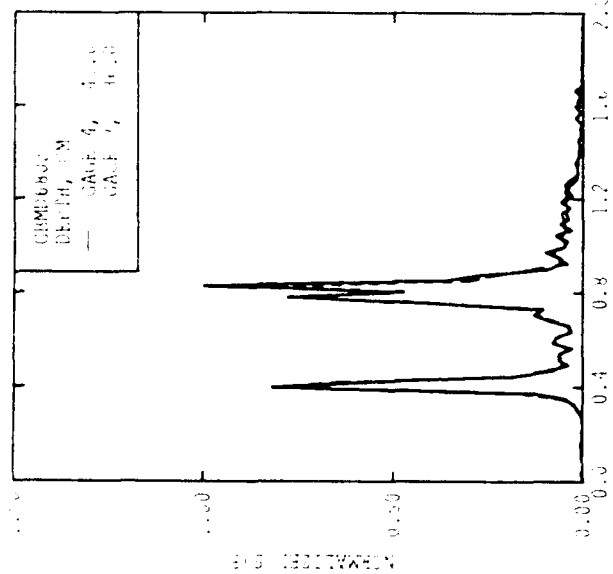
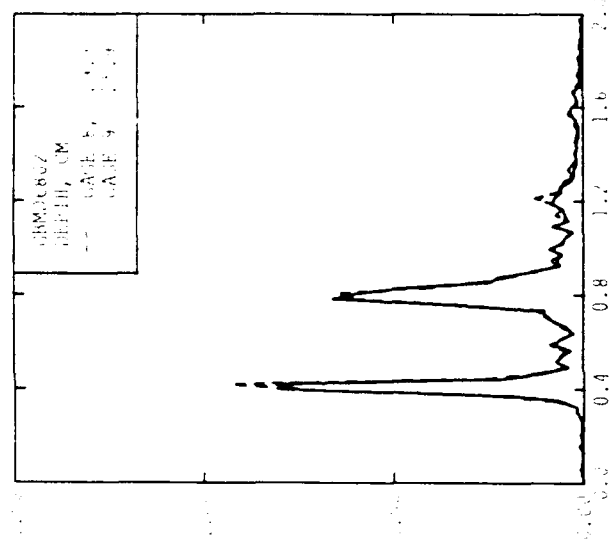
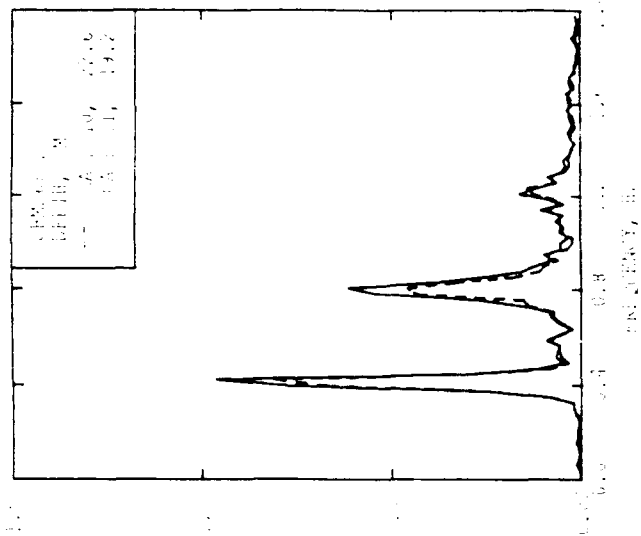


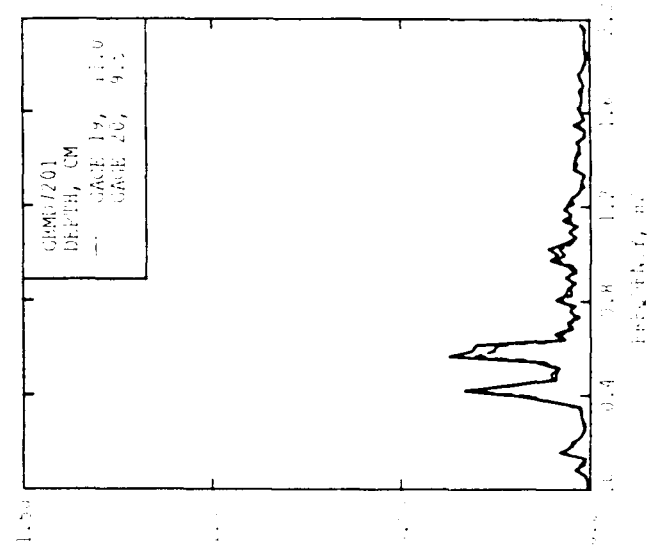
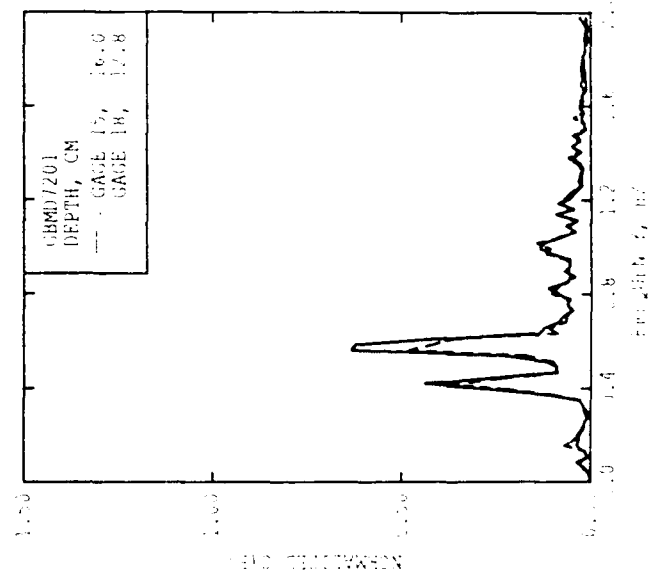
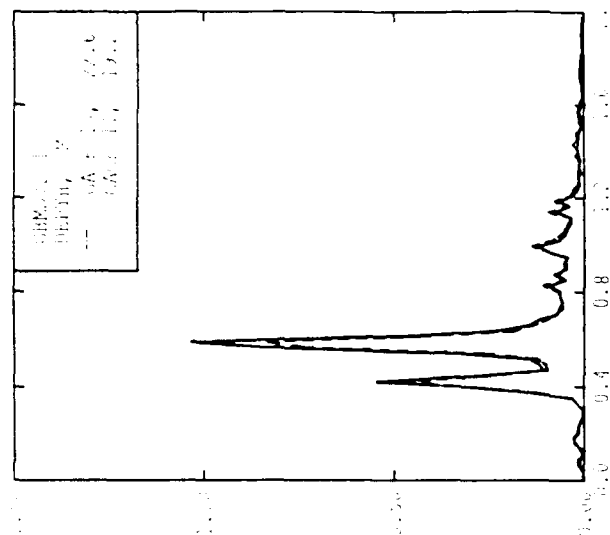
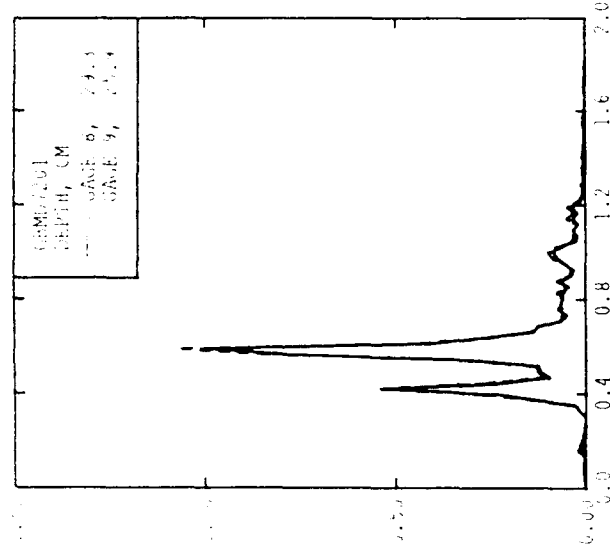
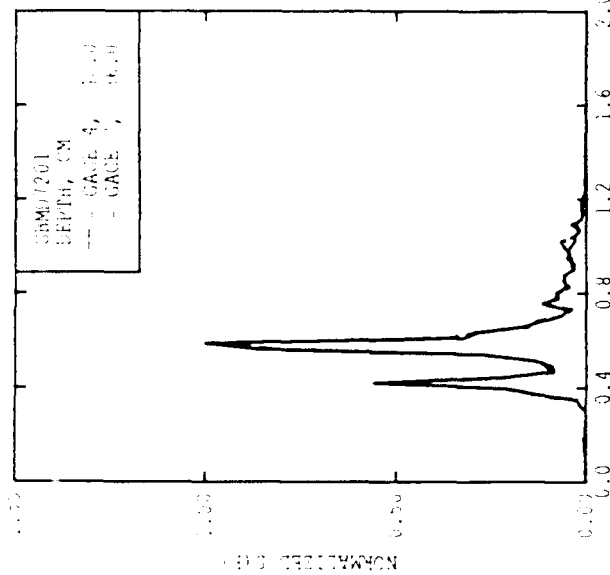




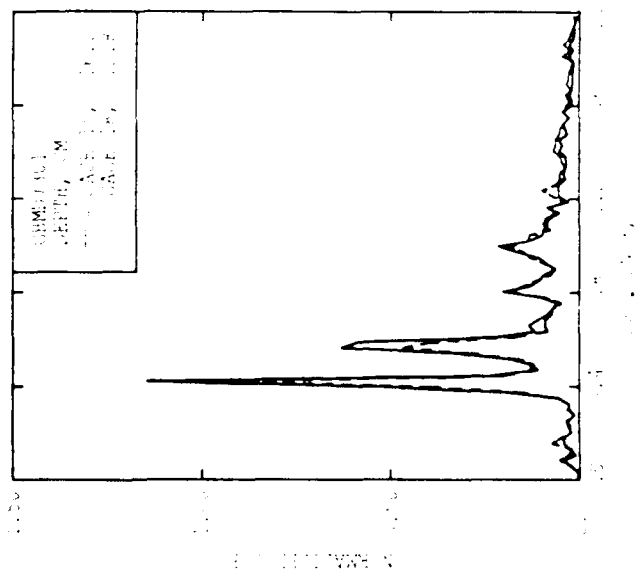
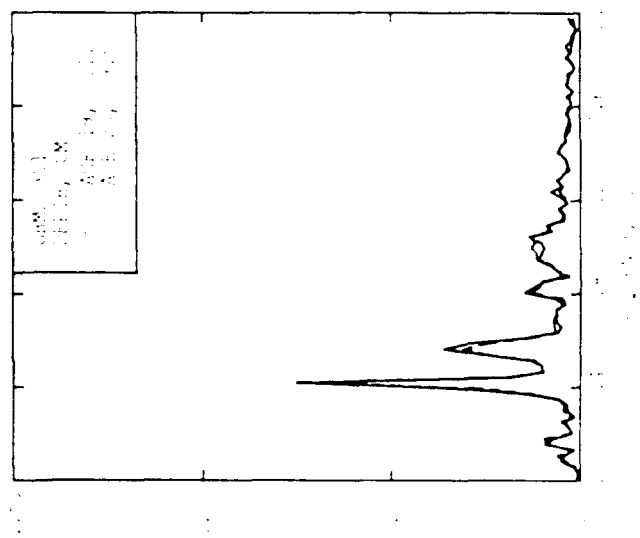
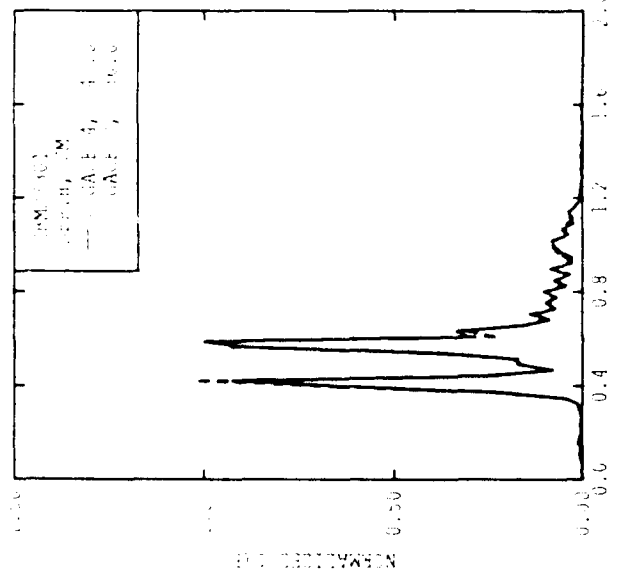
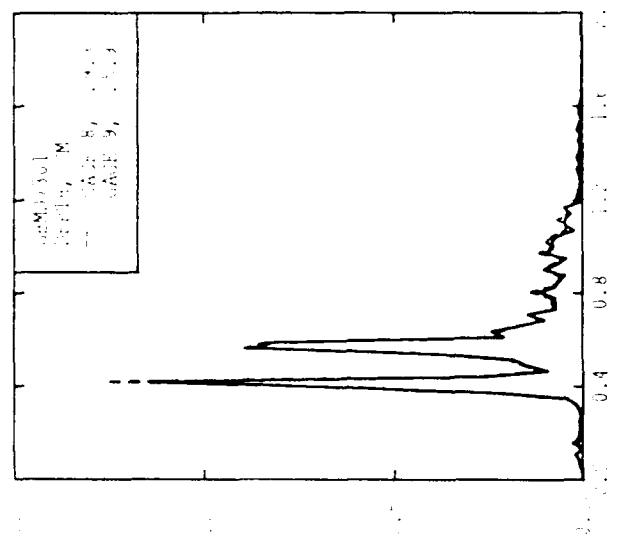
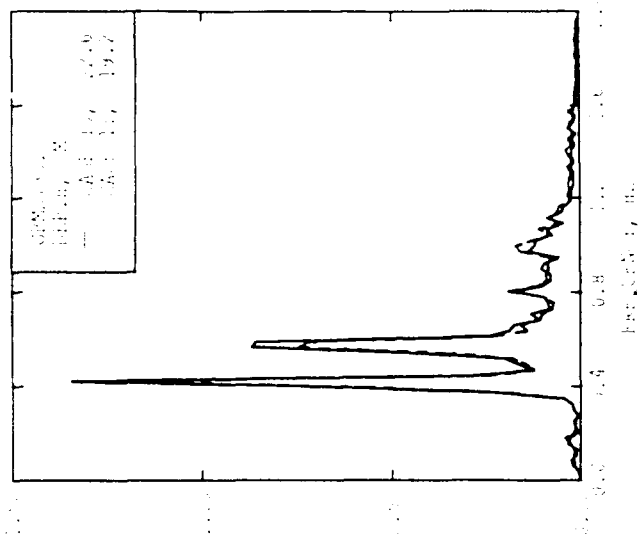


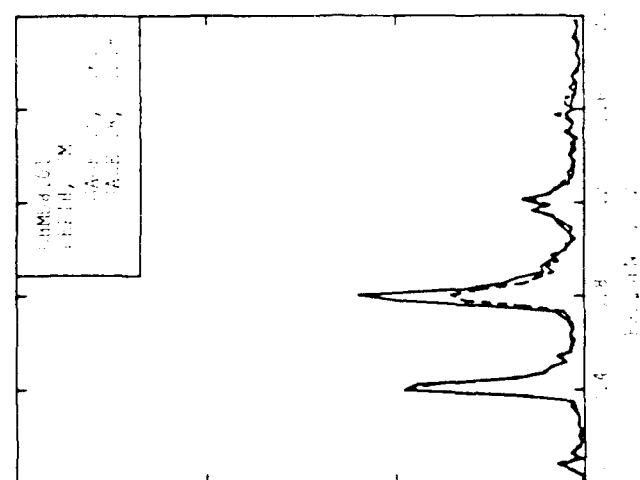
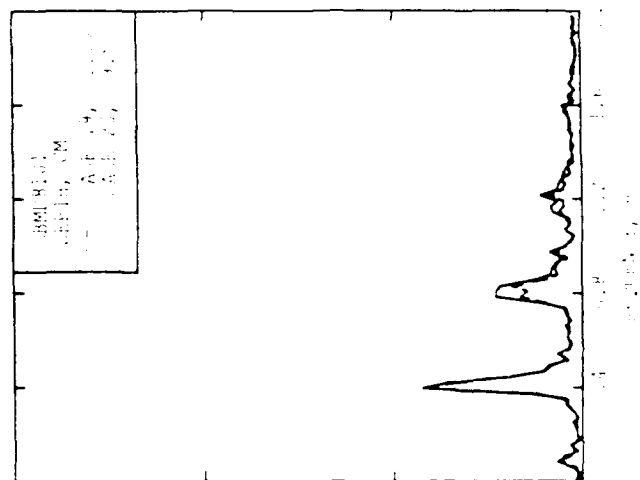
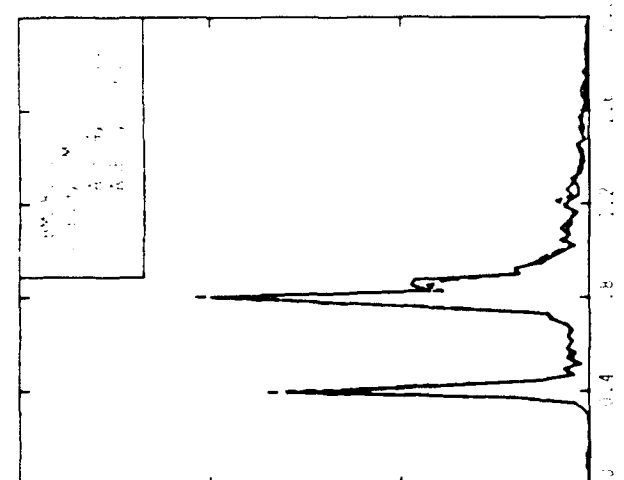
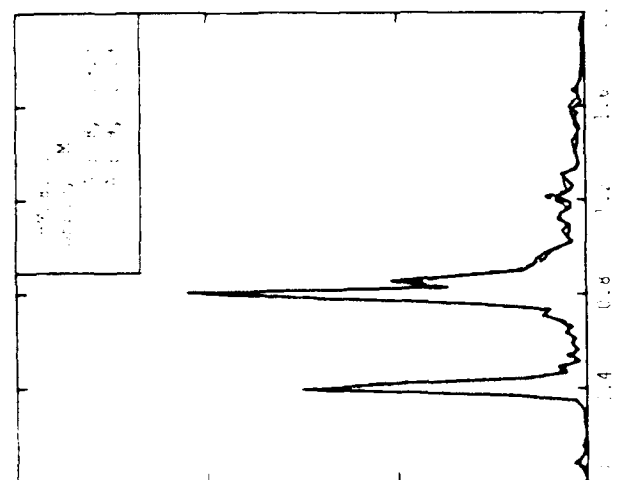
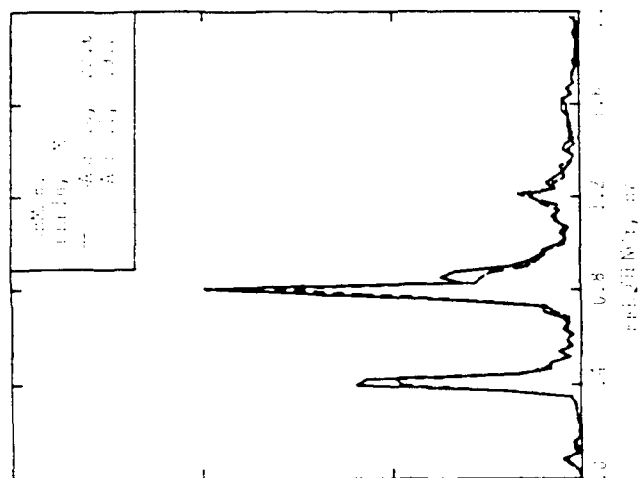


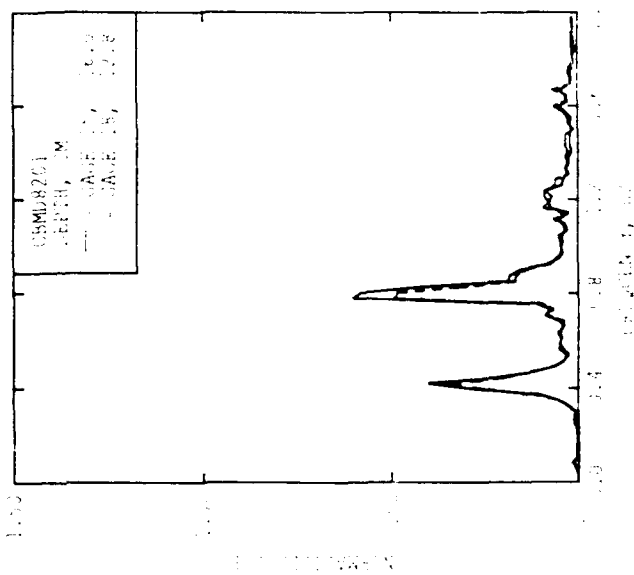
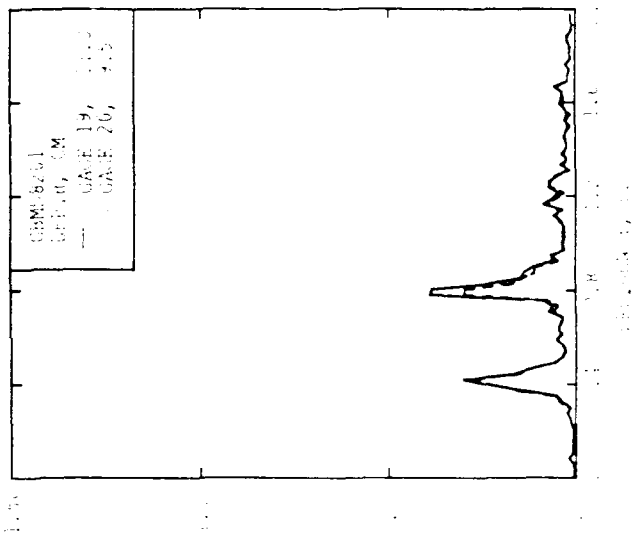
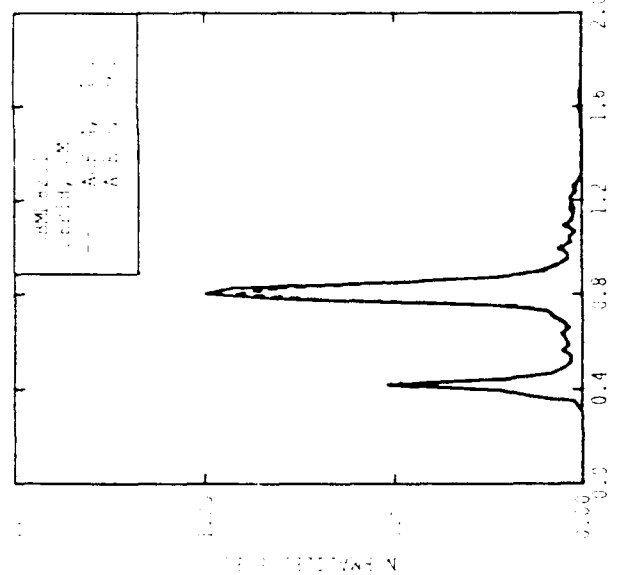
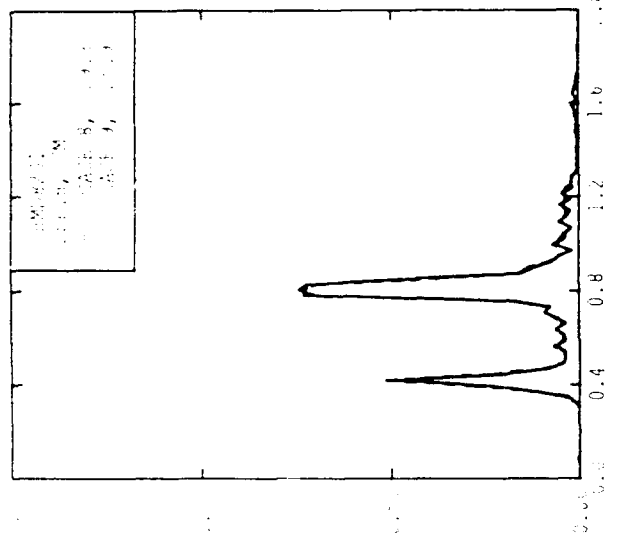
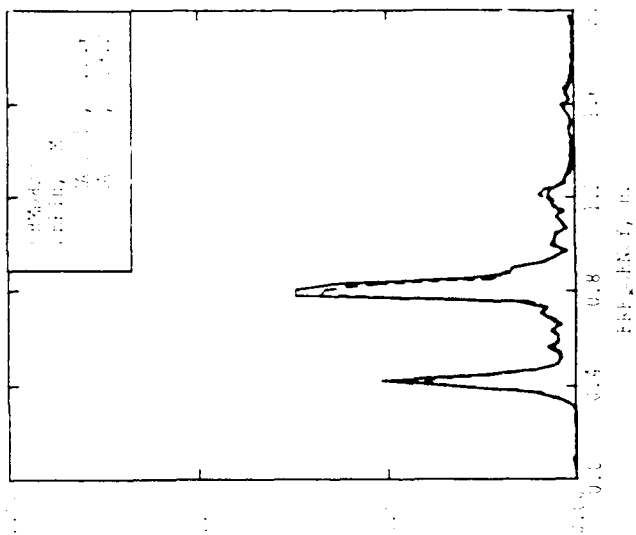


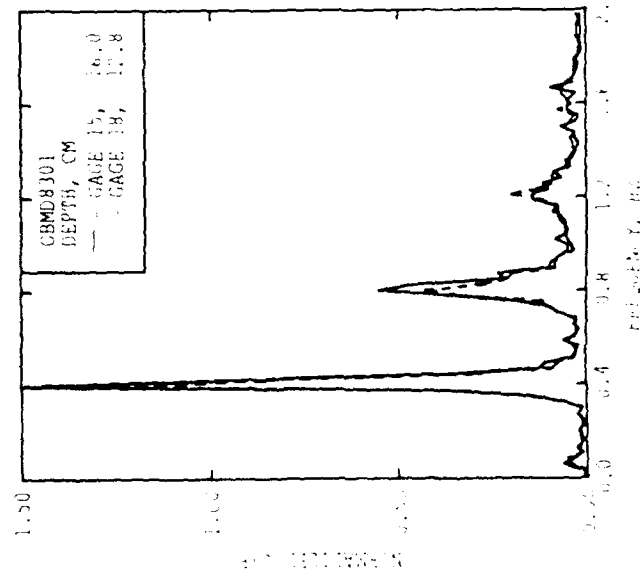
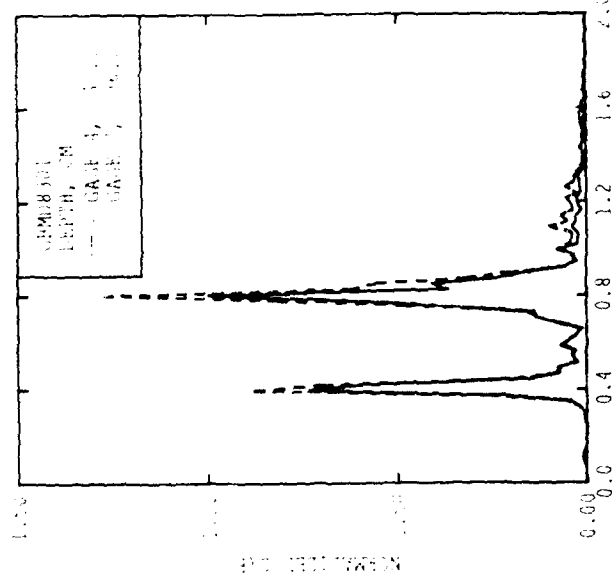
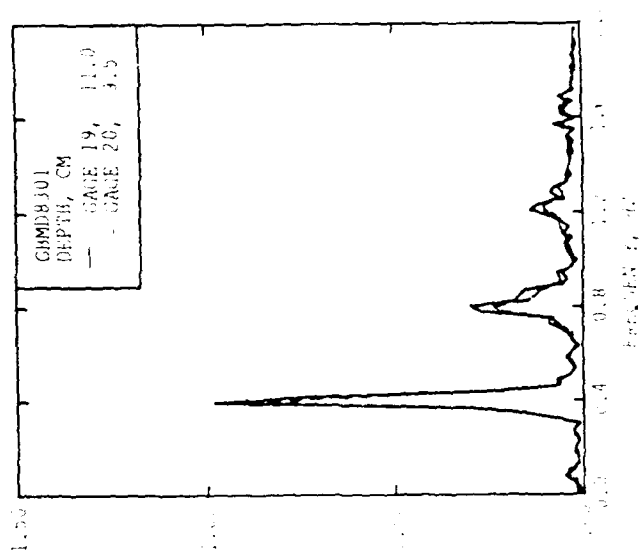
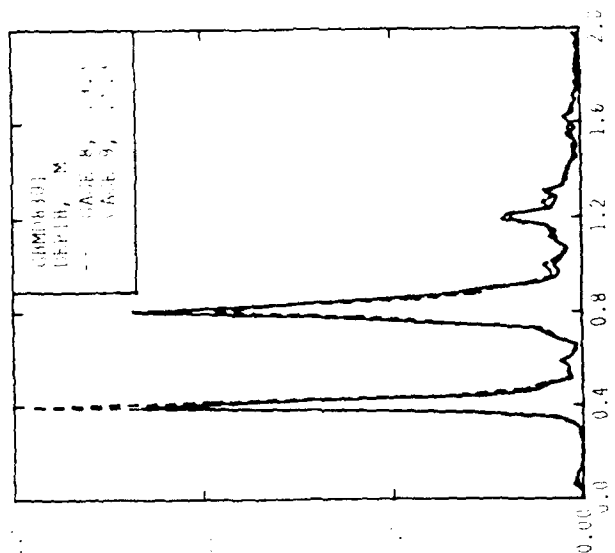
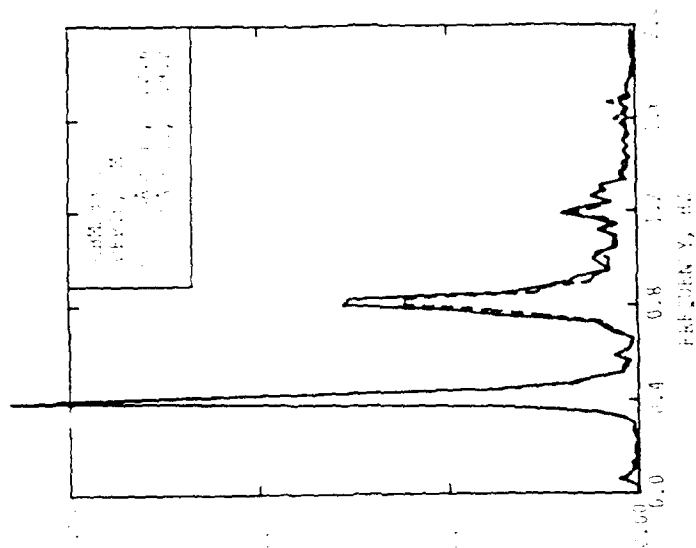


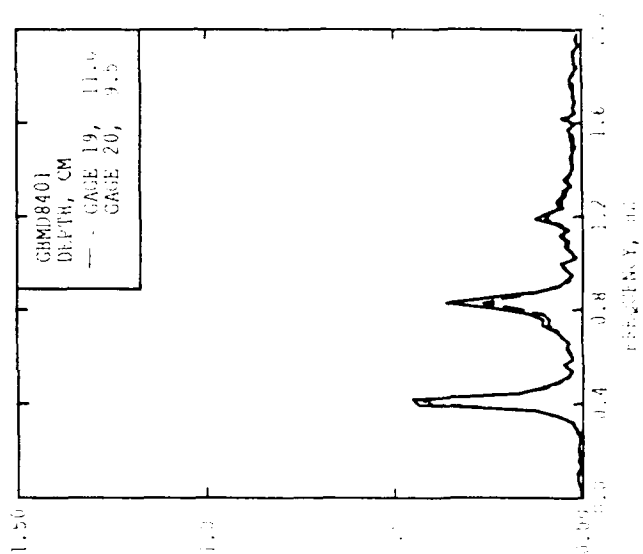
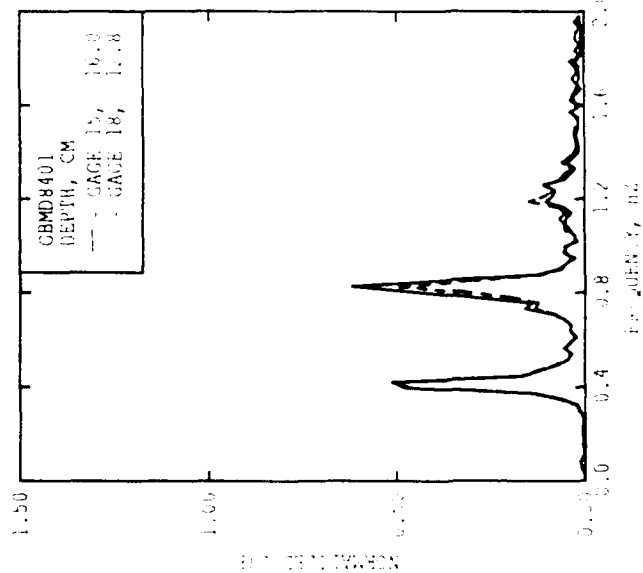
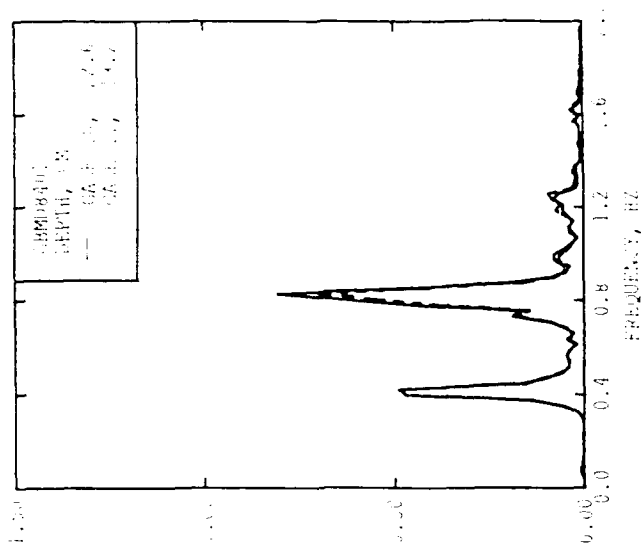
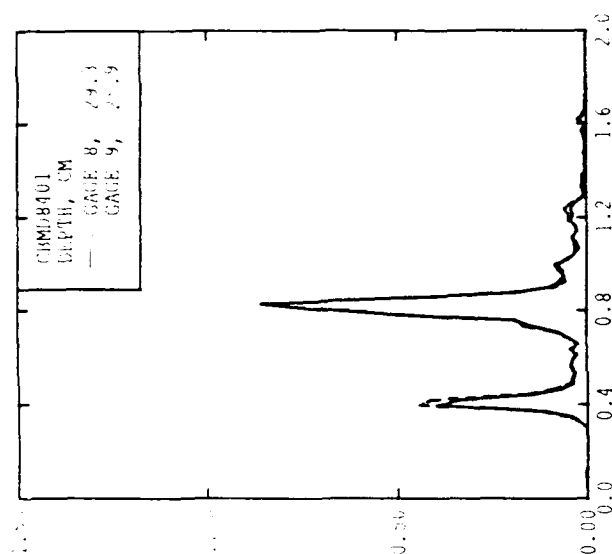
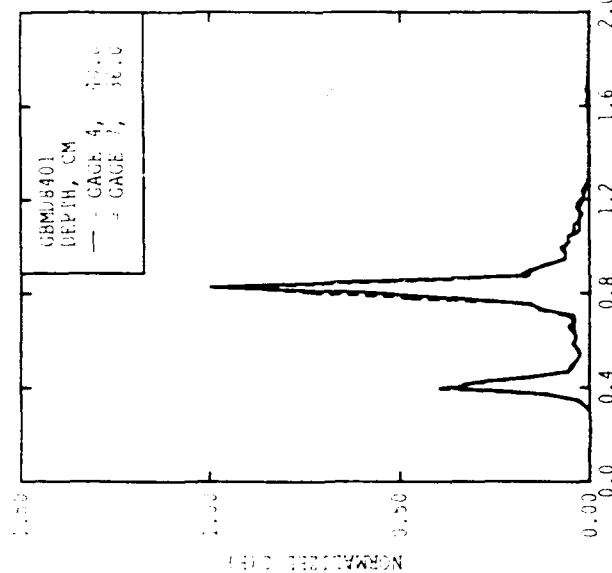


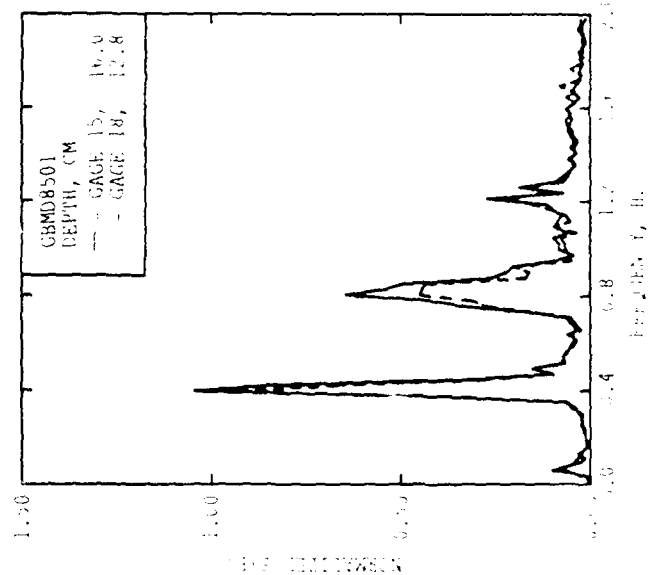
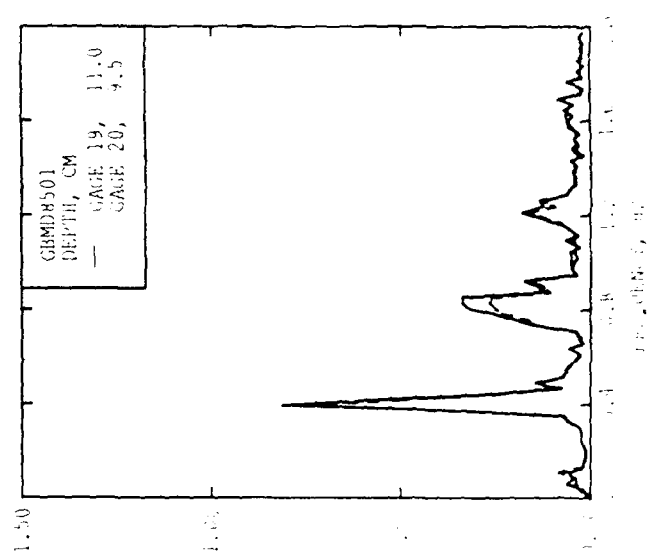
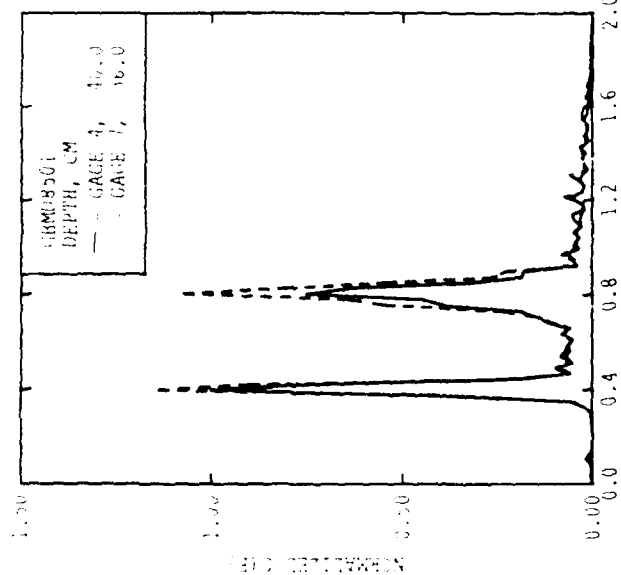
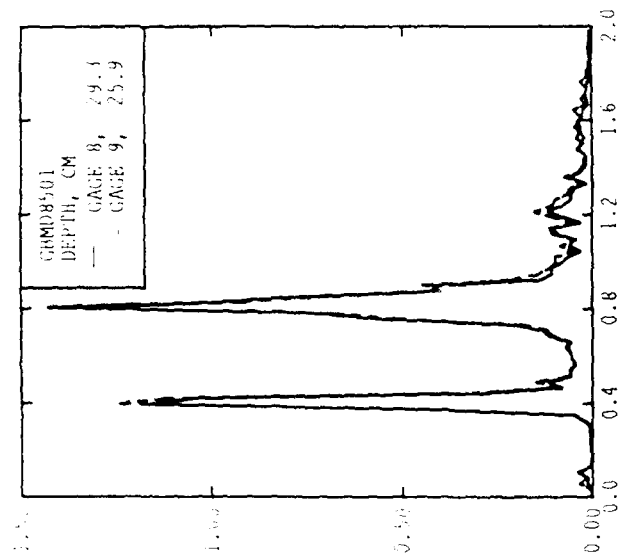
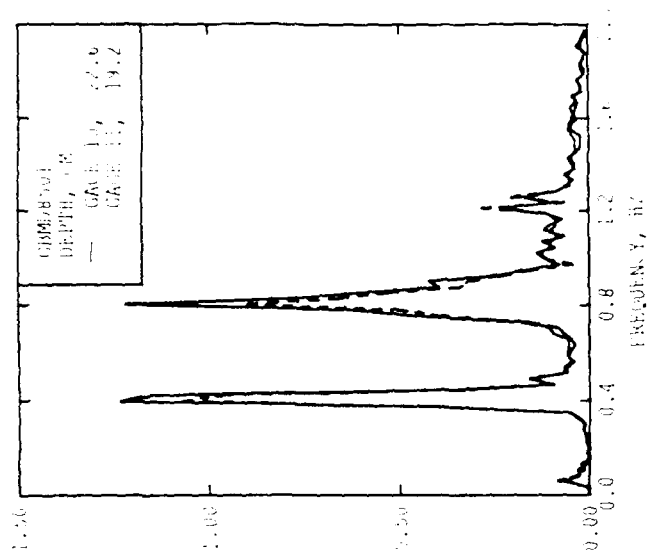


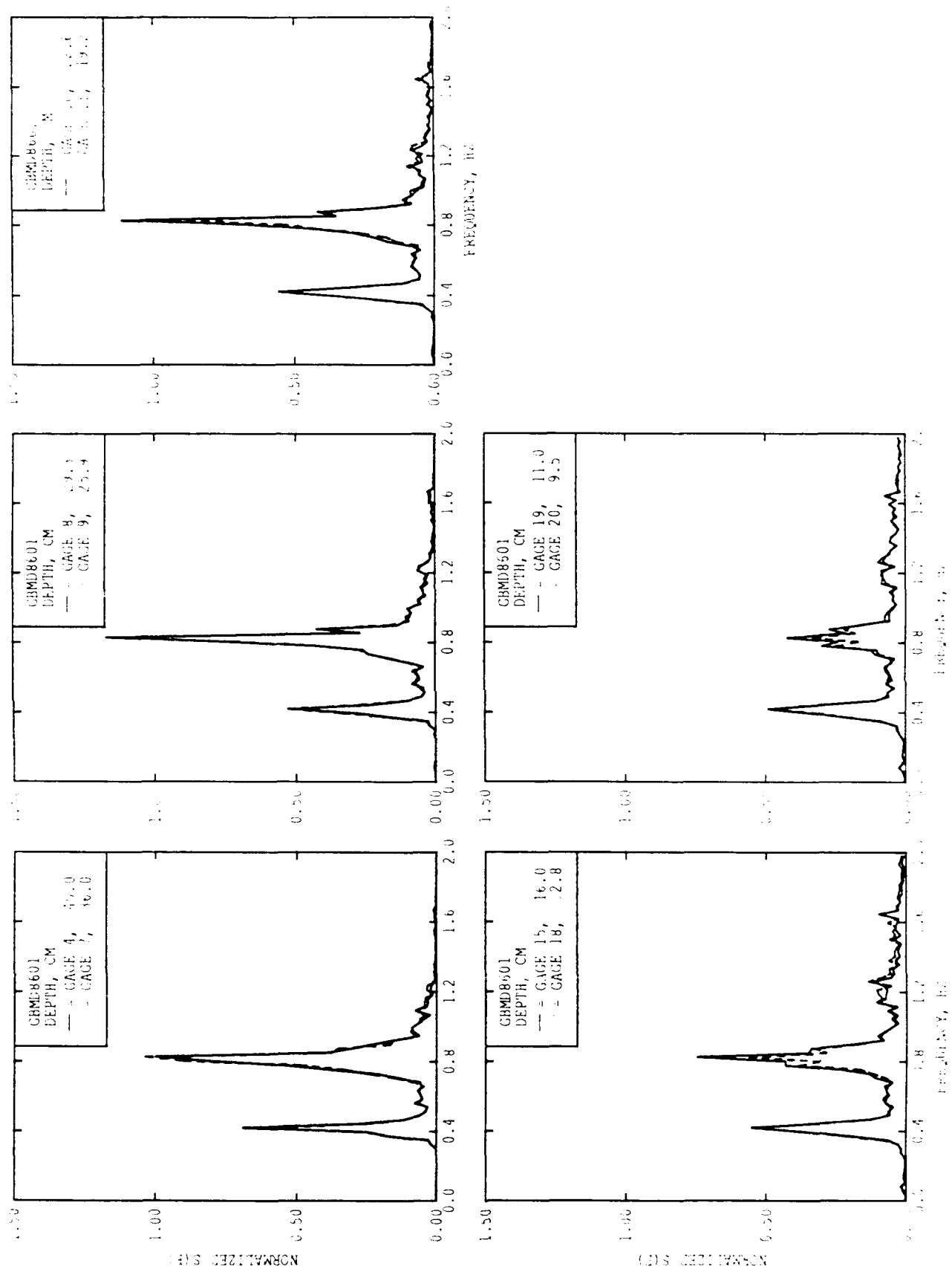


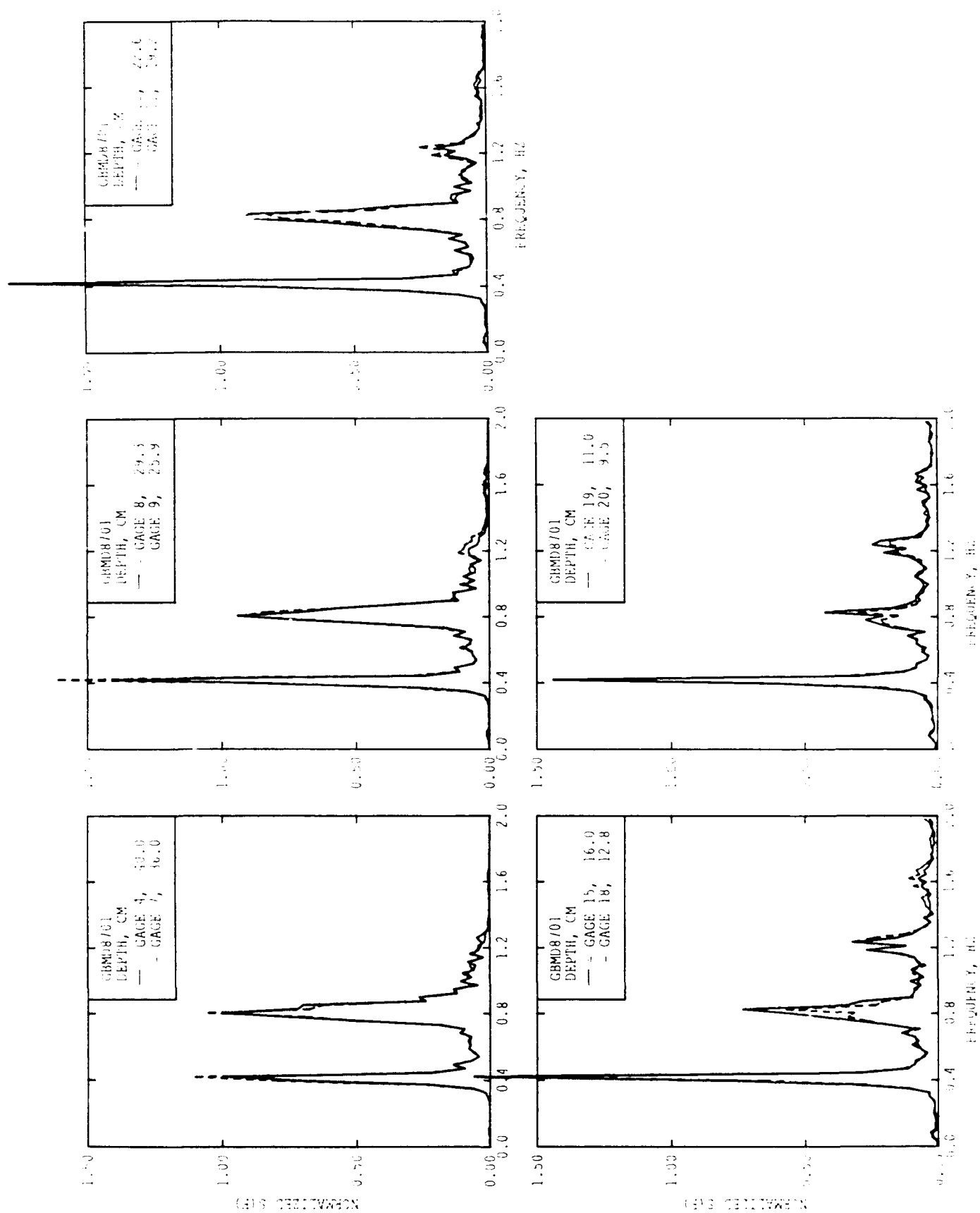






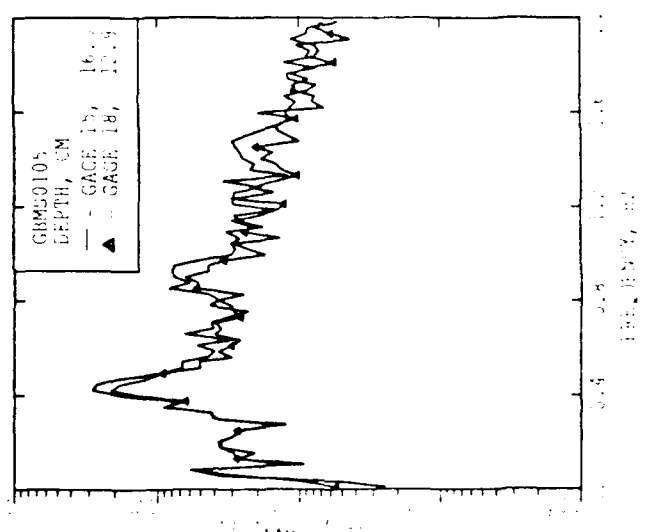
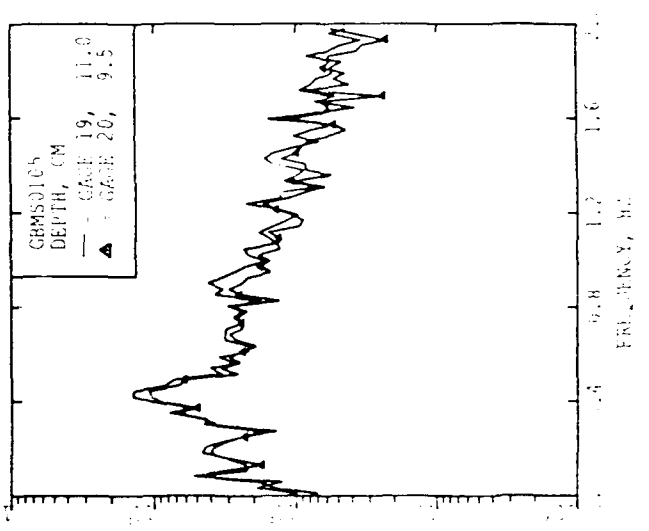
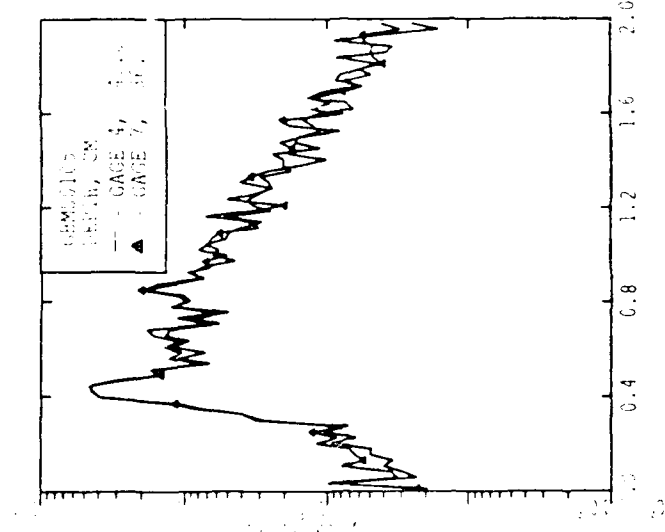
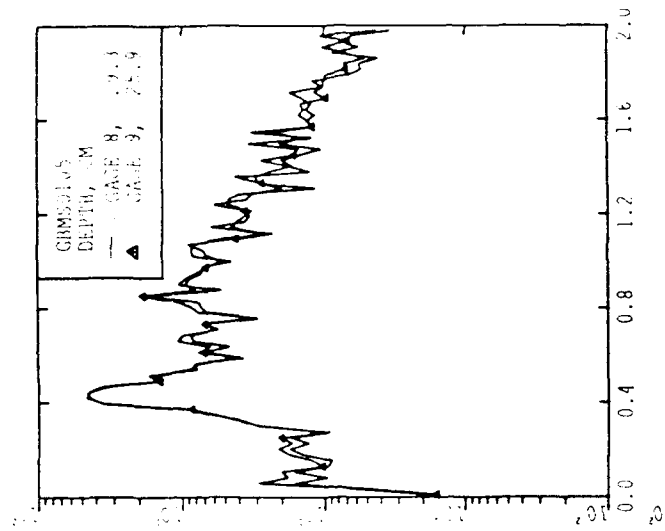
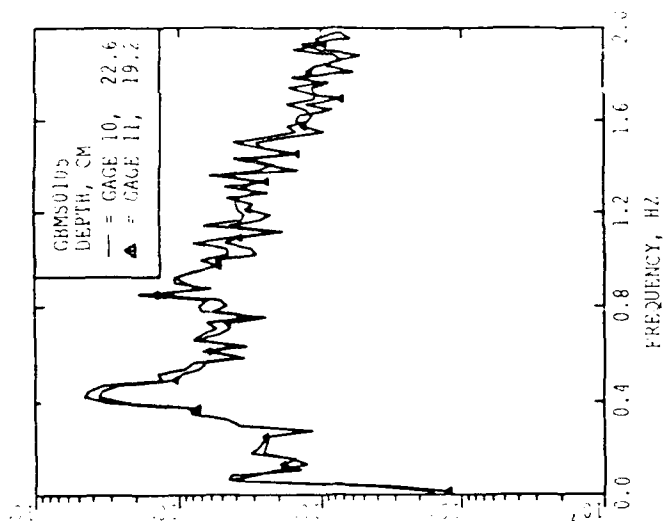


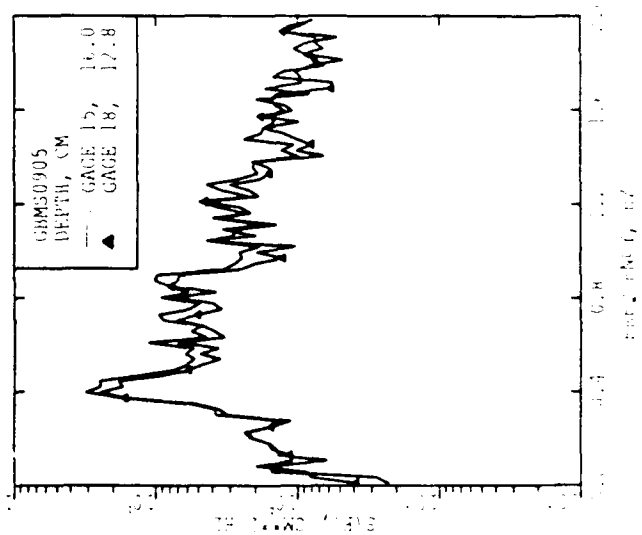
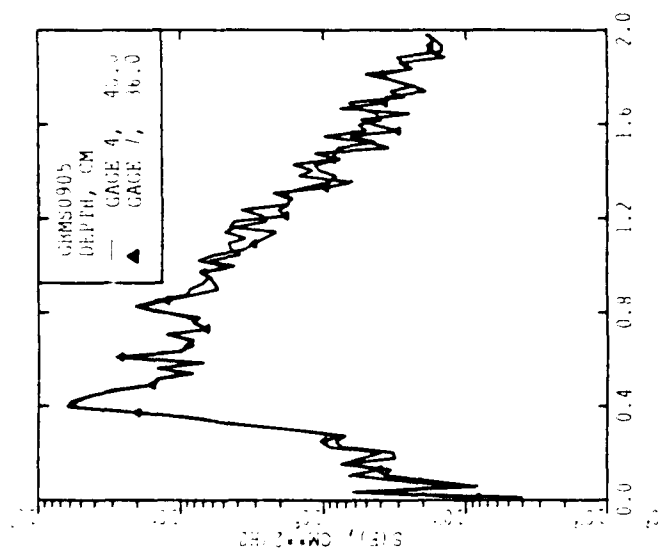
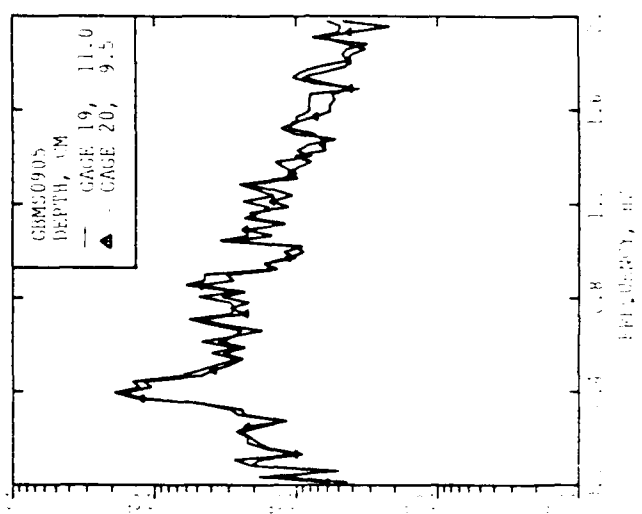
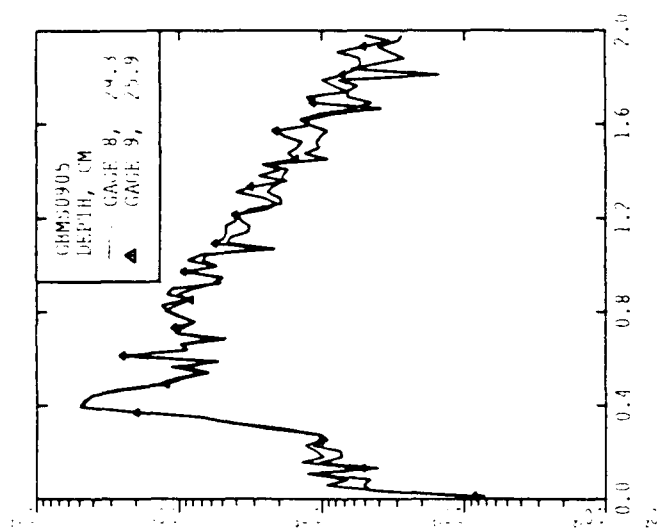
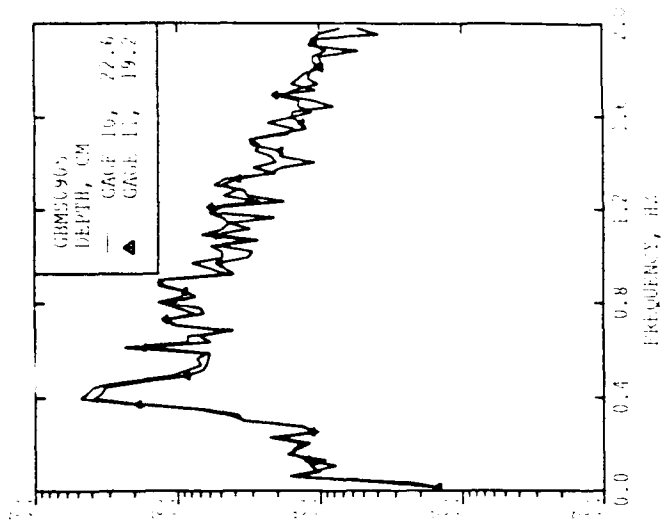


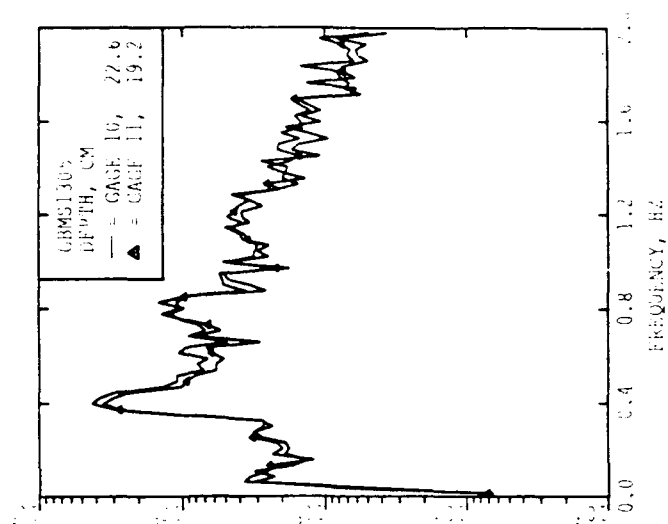
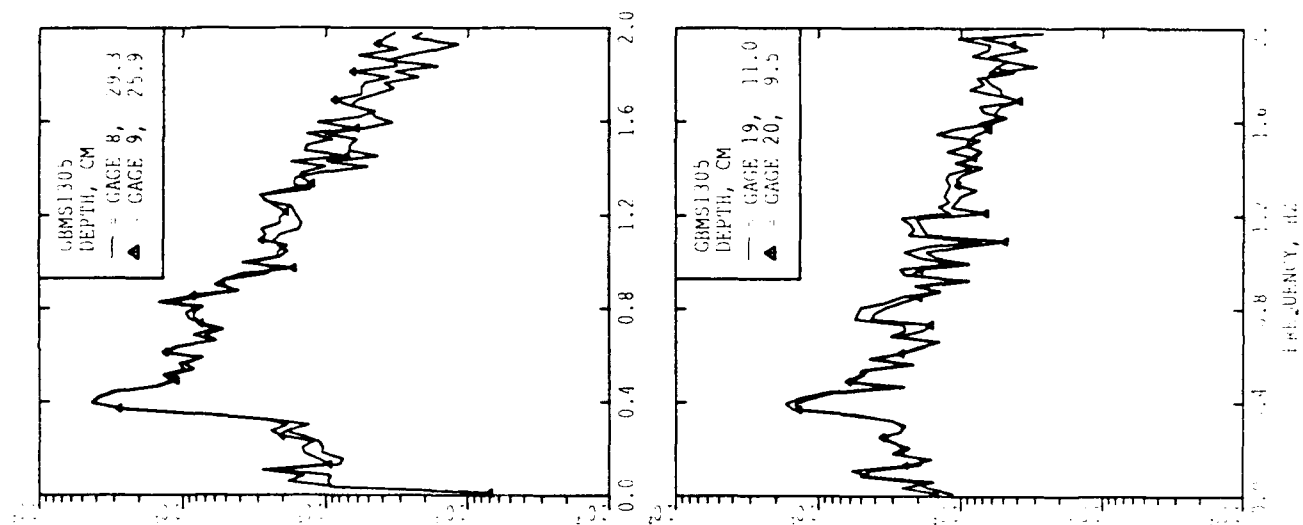
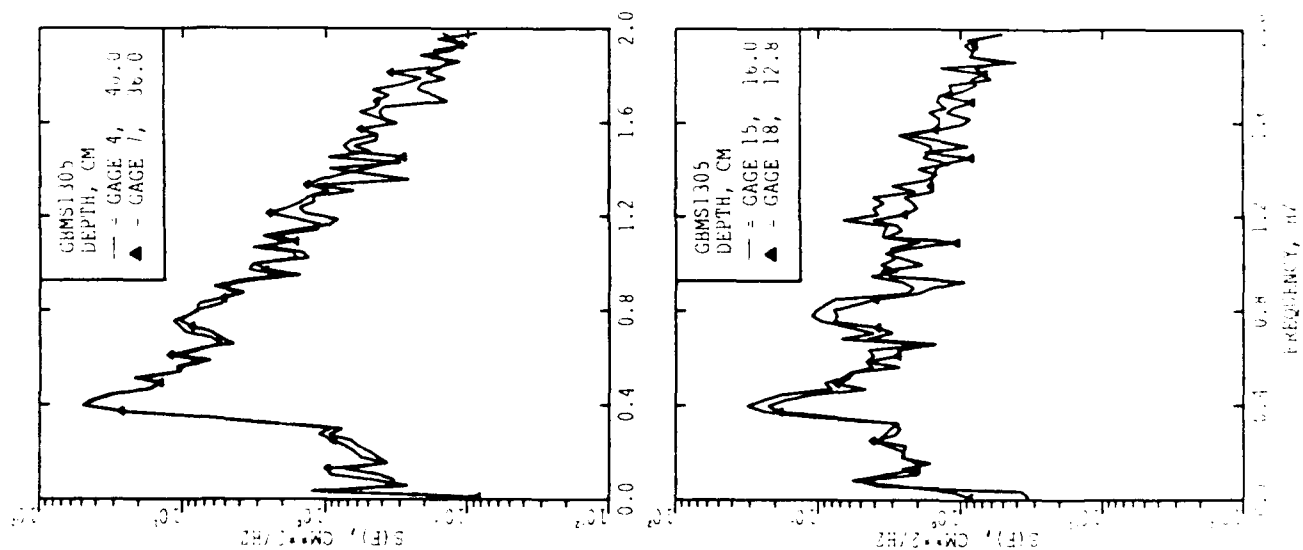


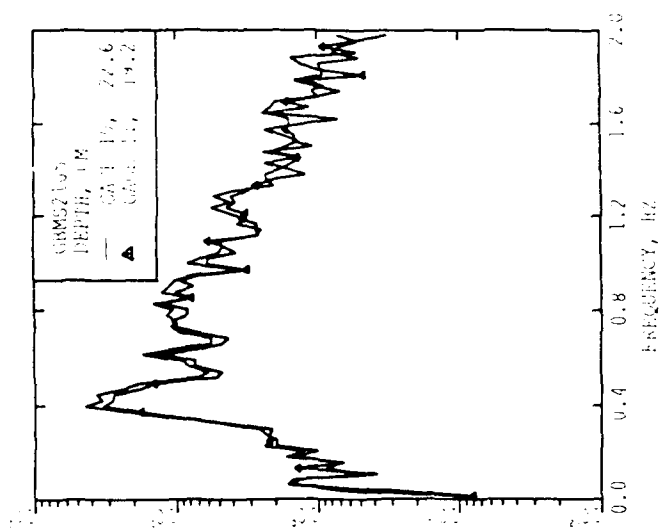
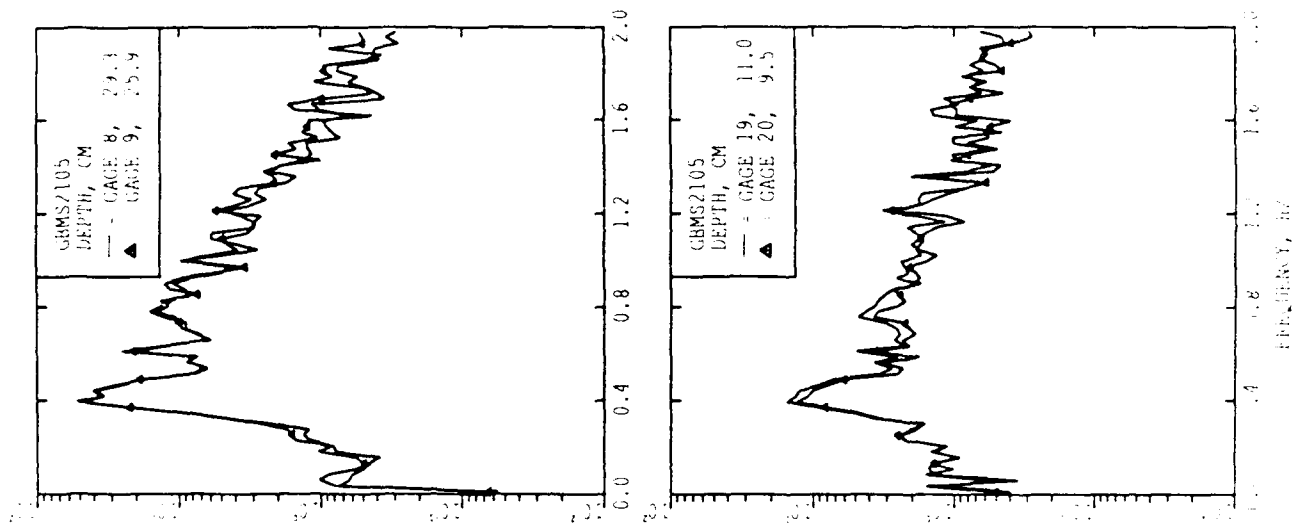
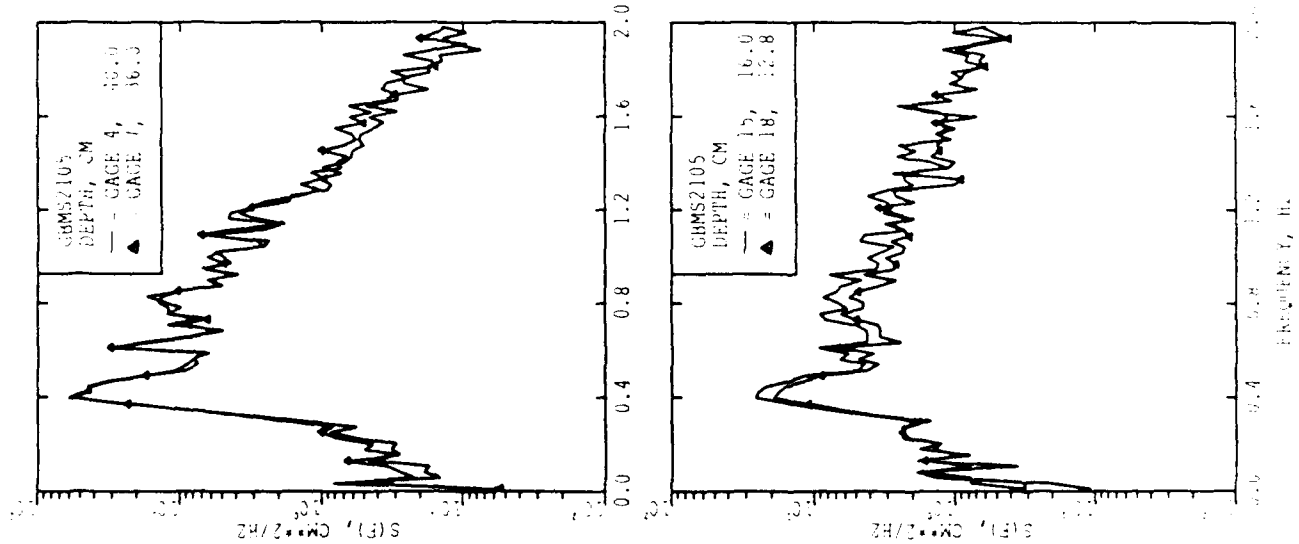


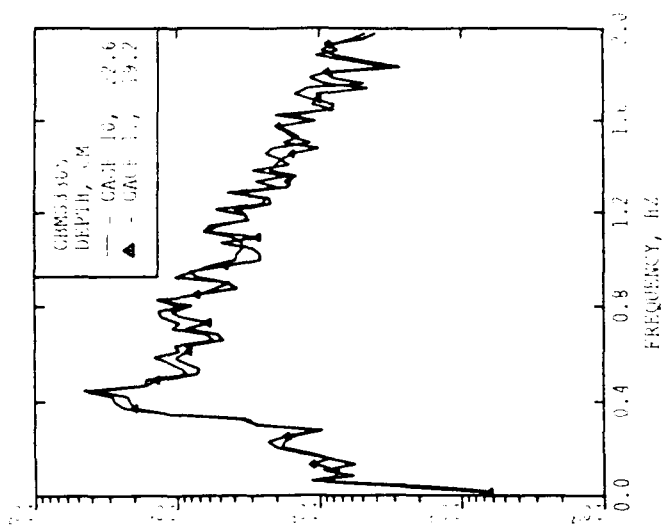
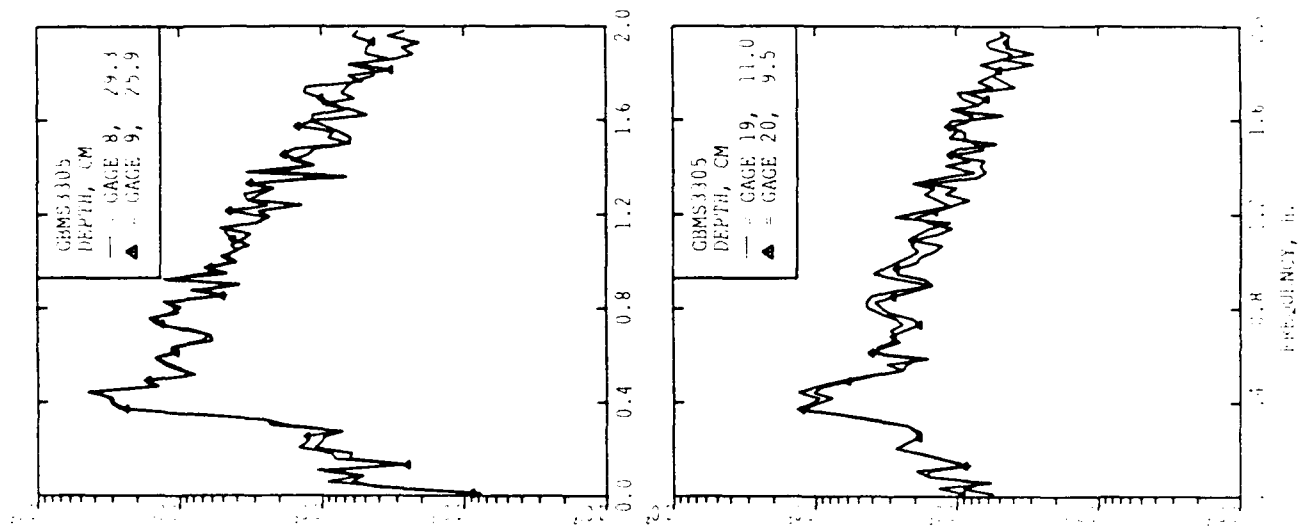
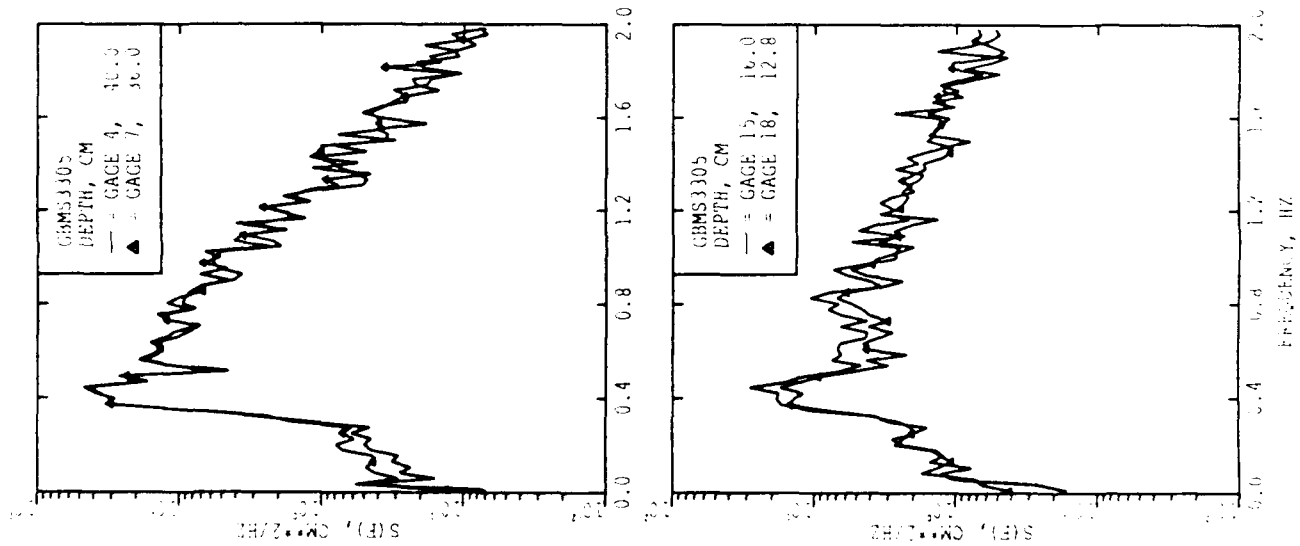
APPENDIX H: SEMILOG CROSS-SHORE ARRAY SPECTRA

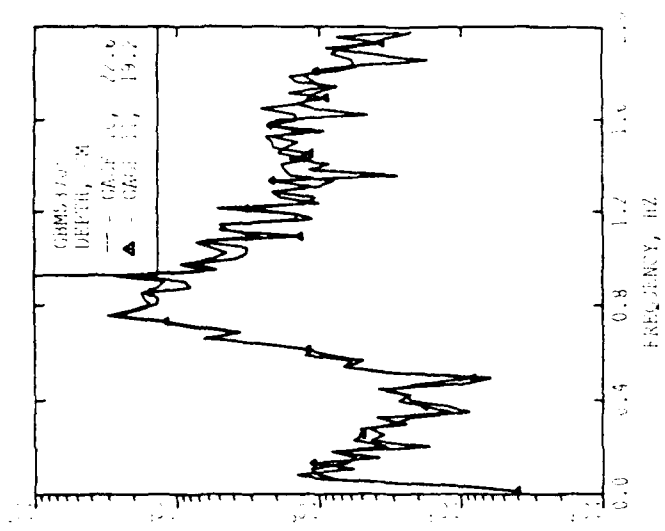
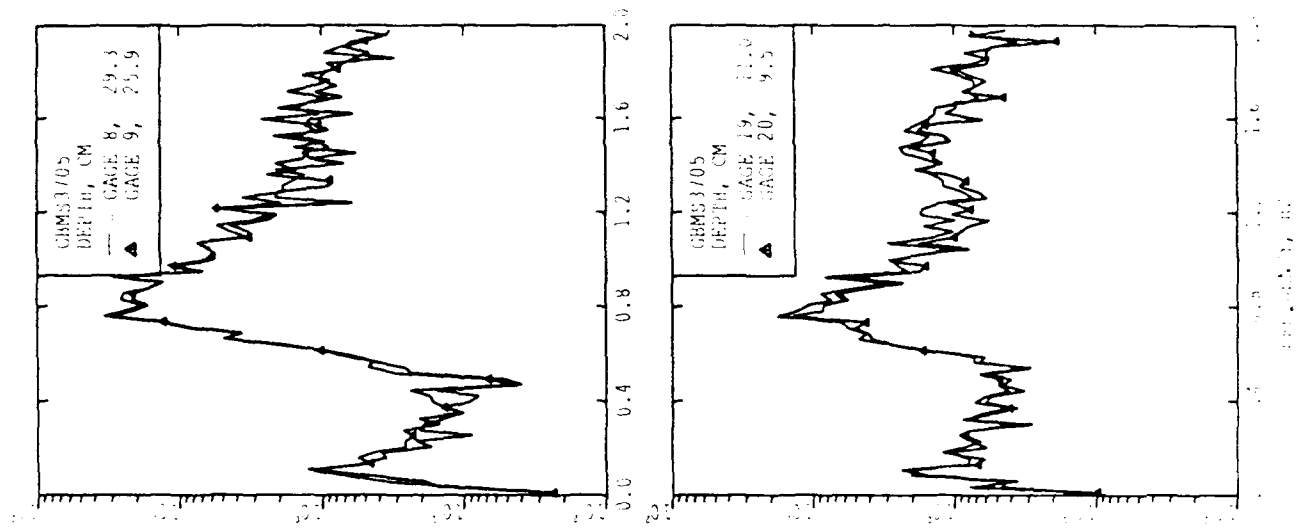
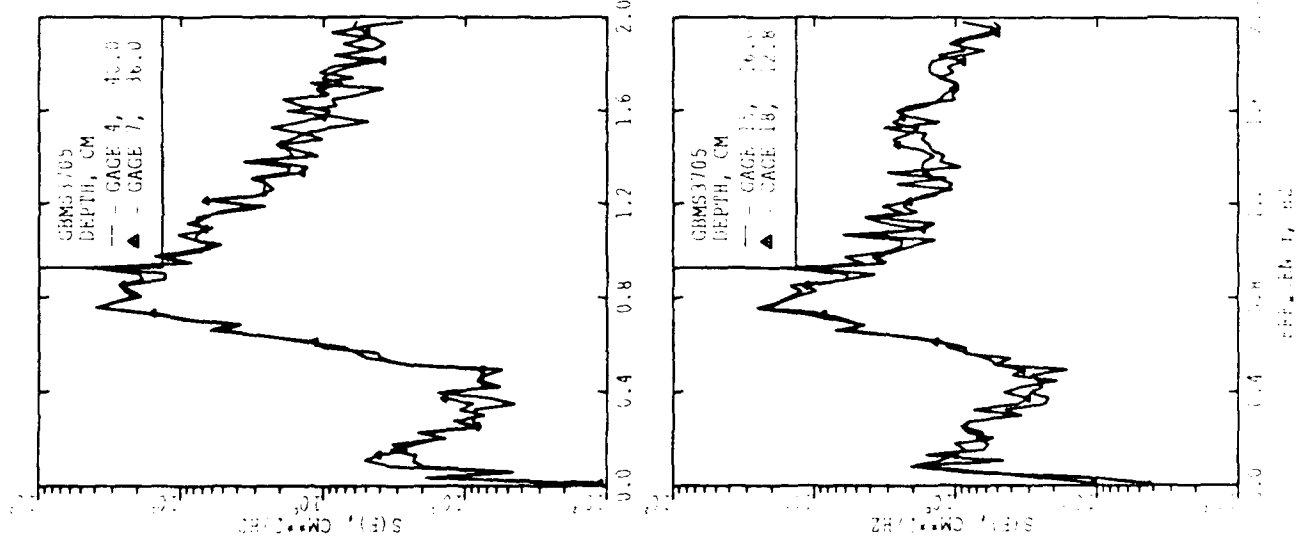


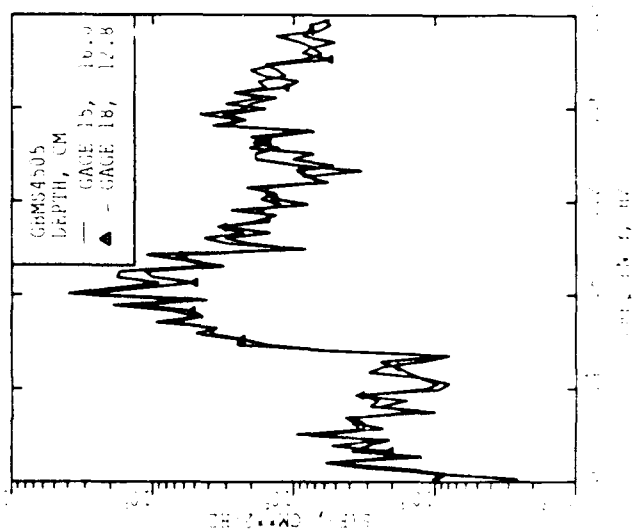
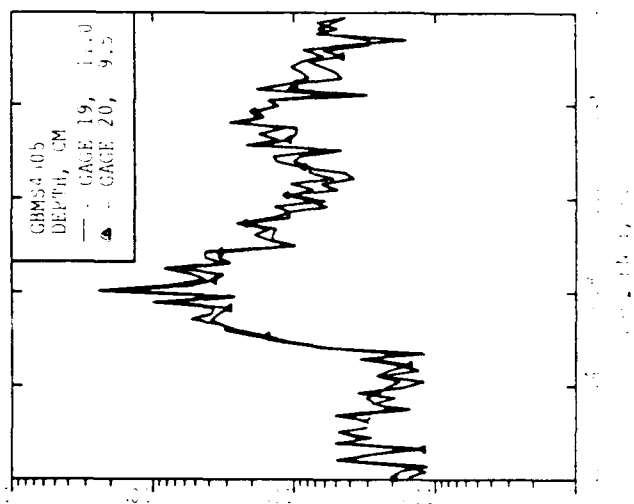
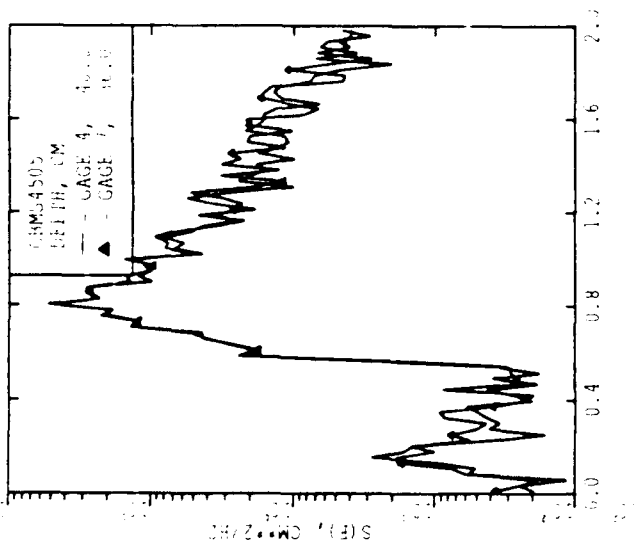
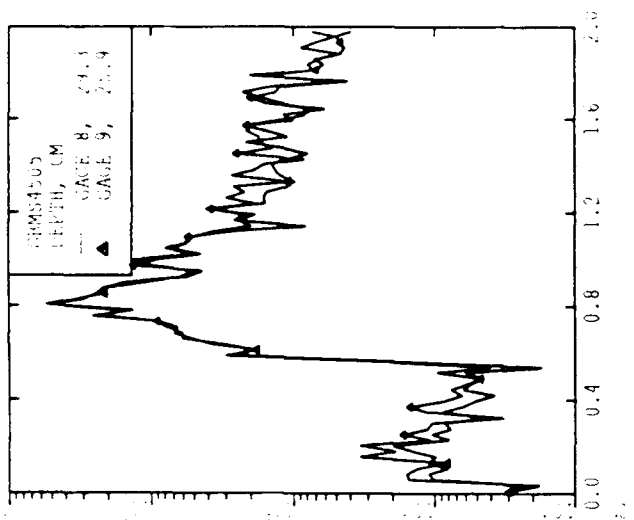
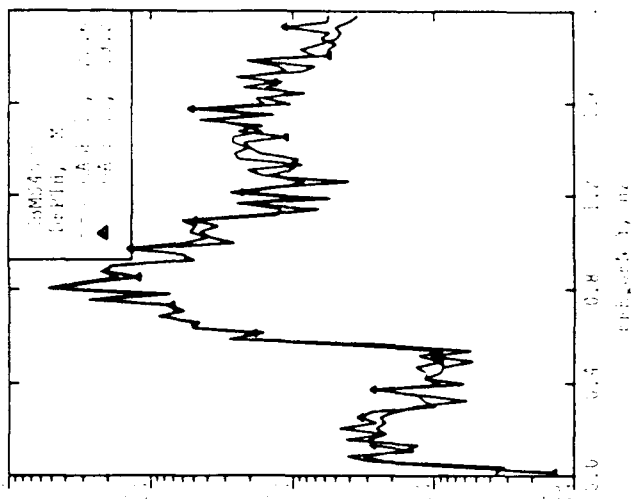




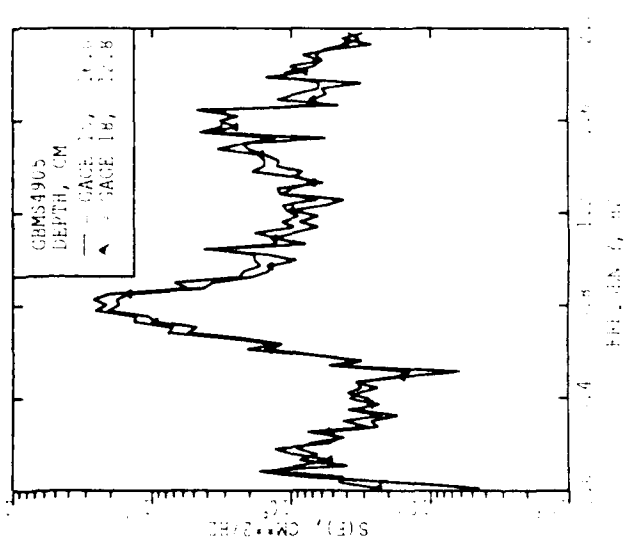
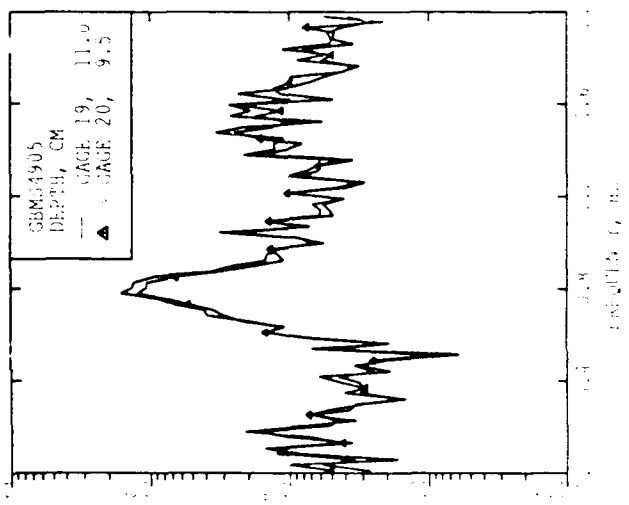
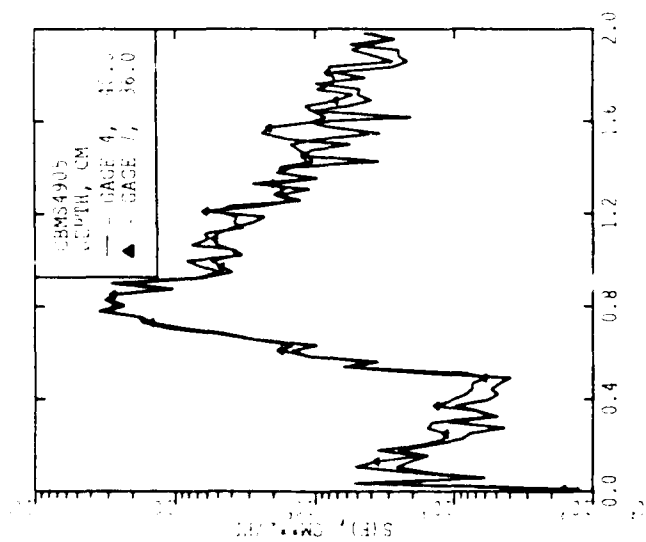
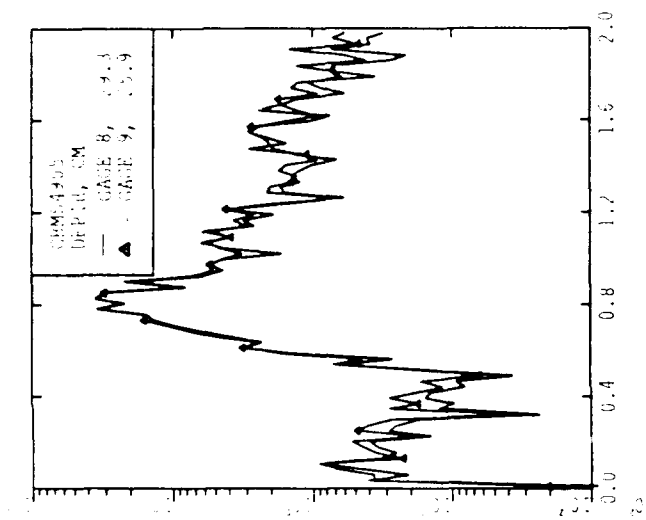
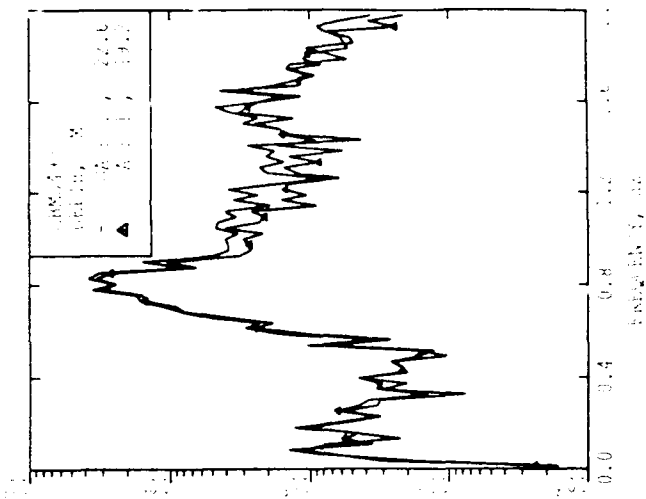


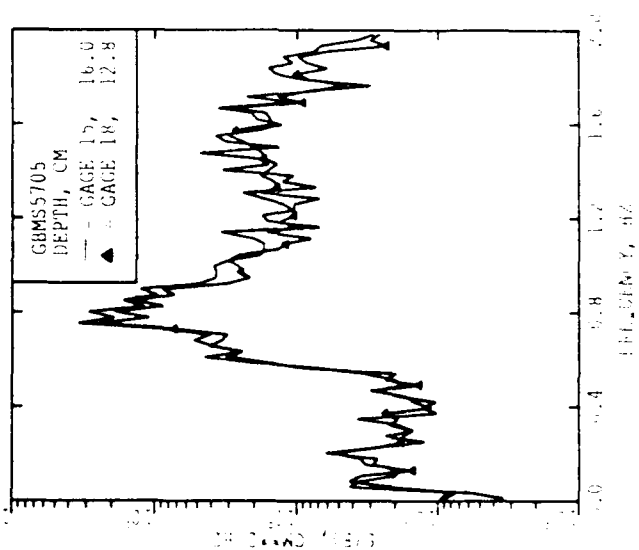
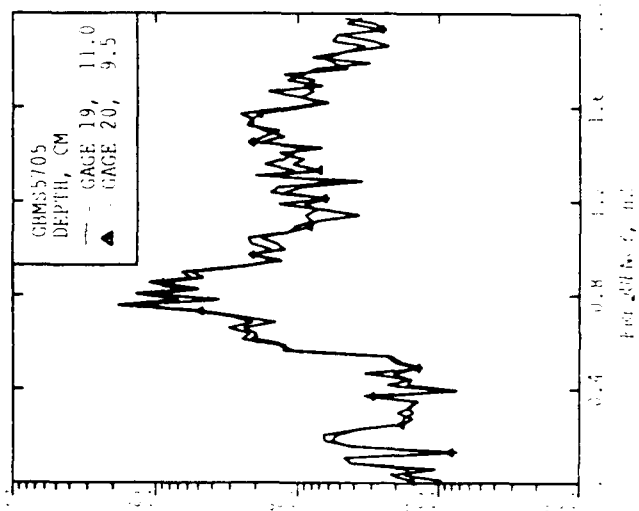
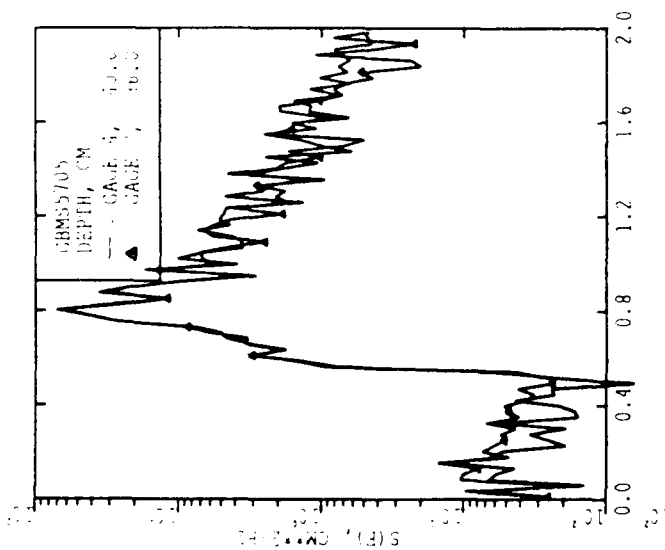
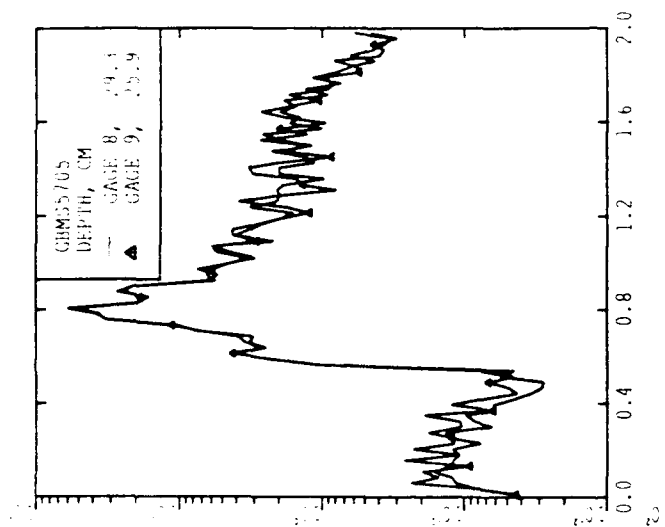
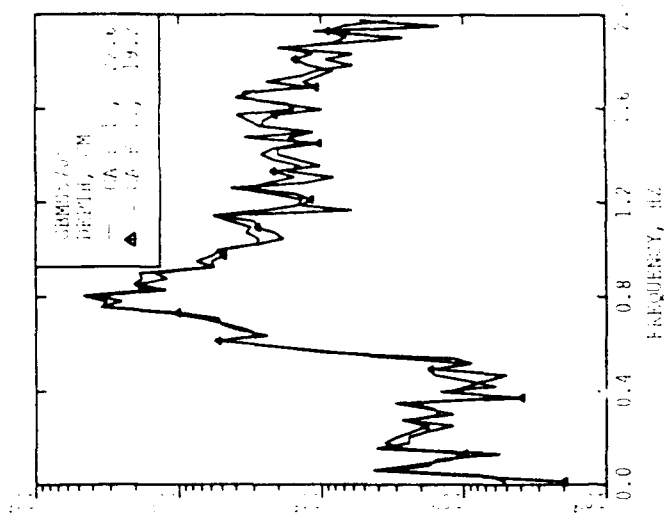


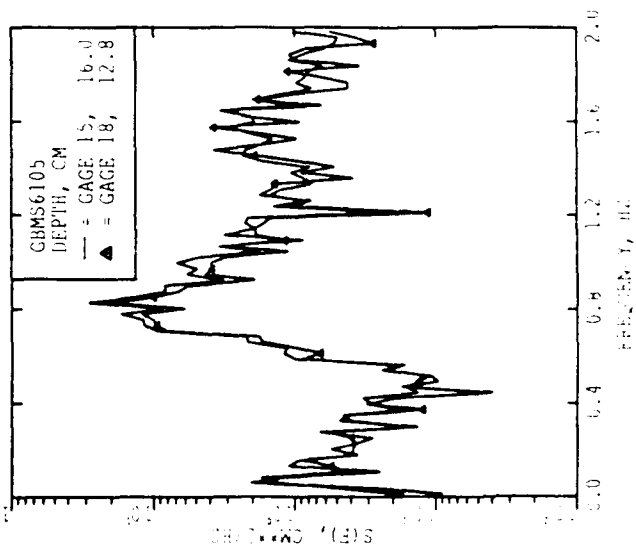
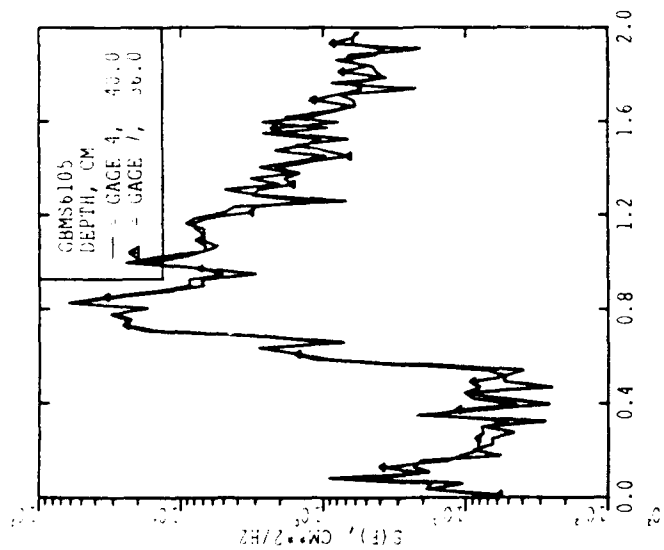
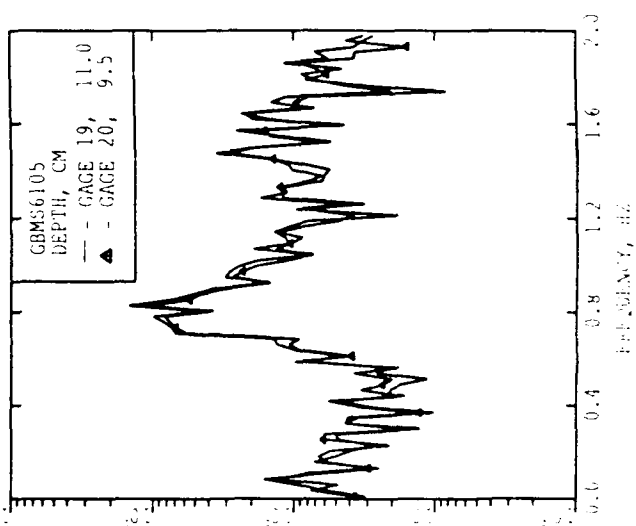
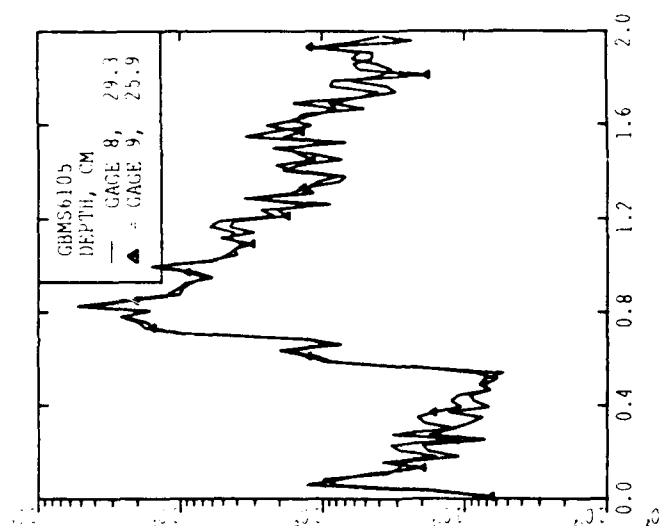
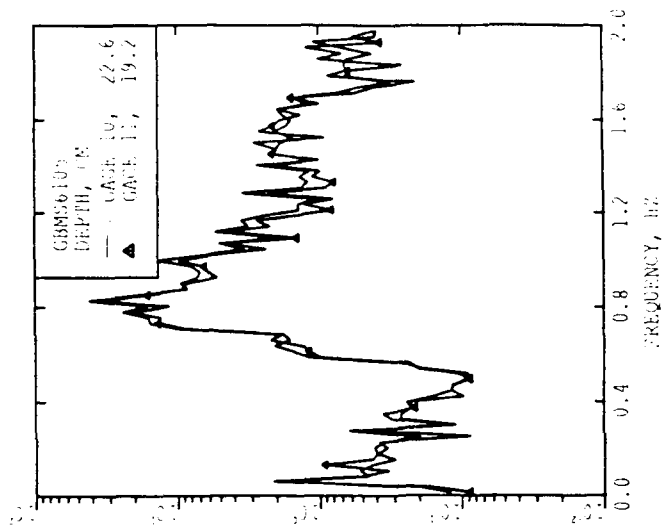


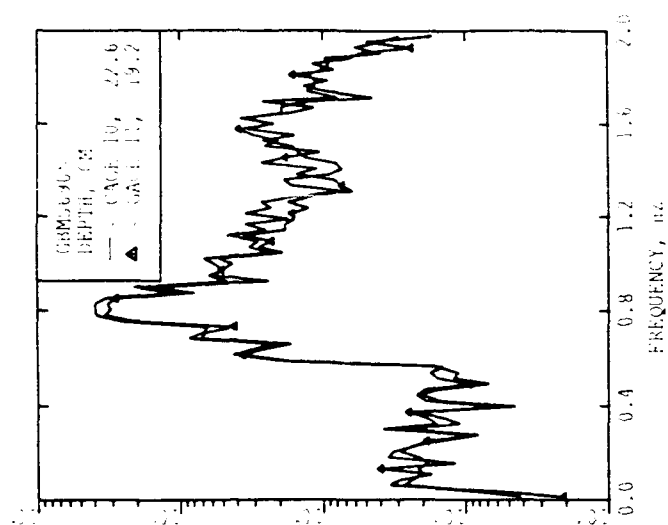
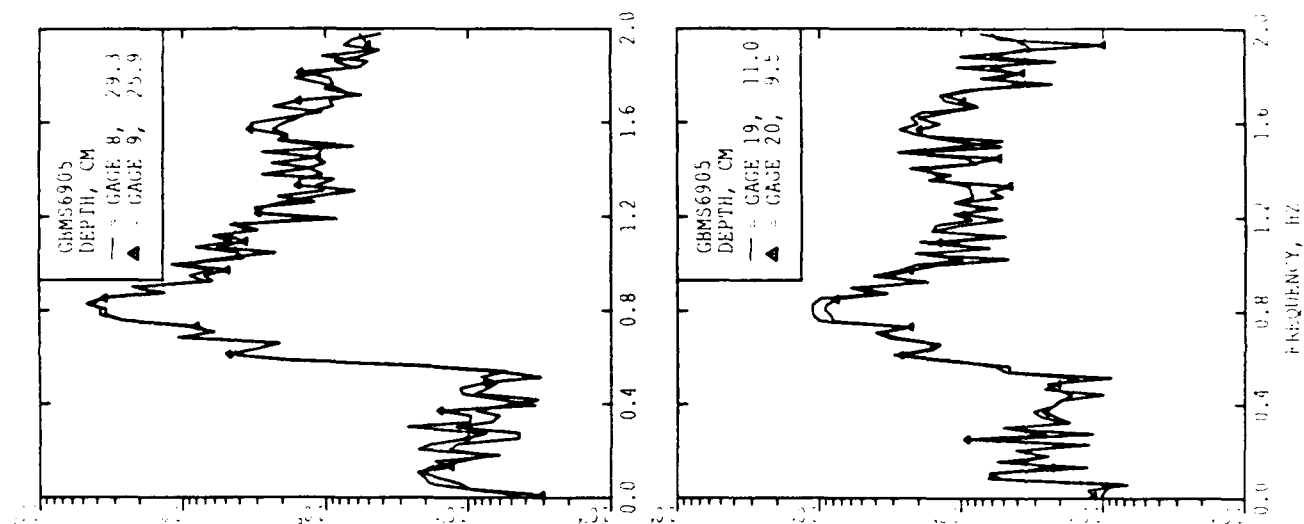
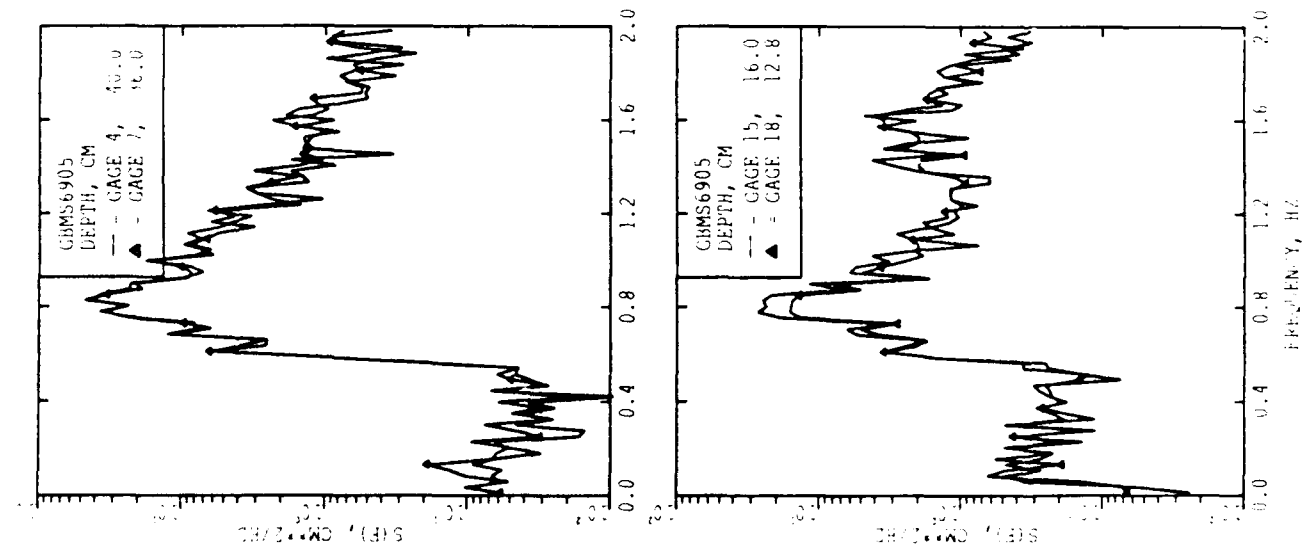


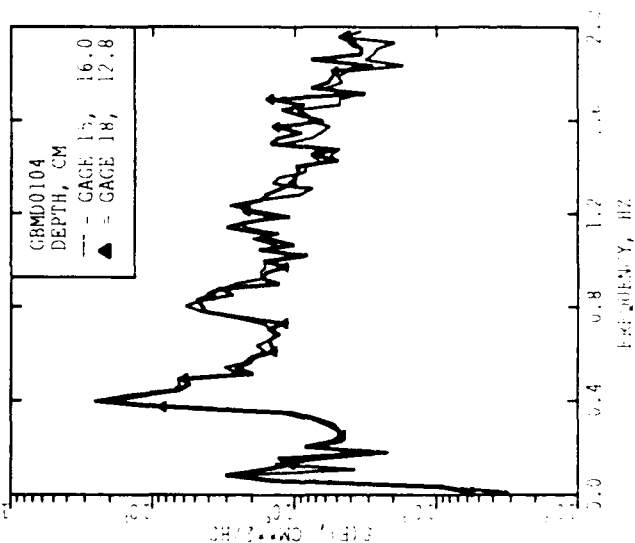
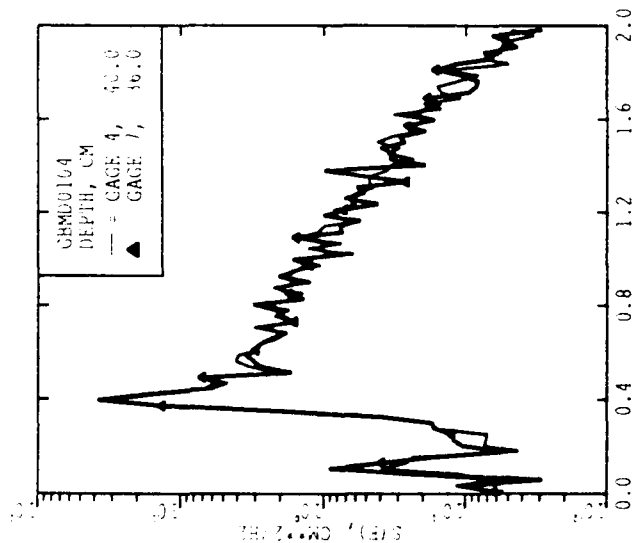
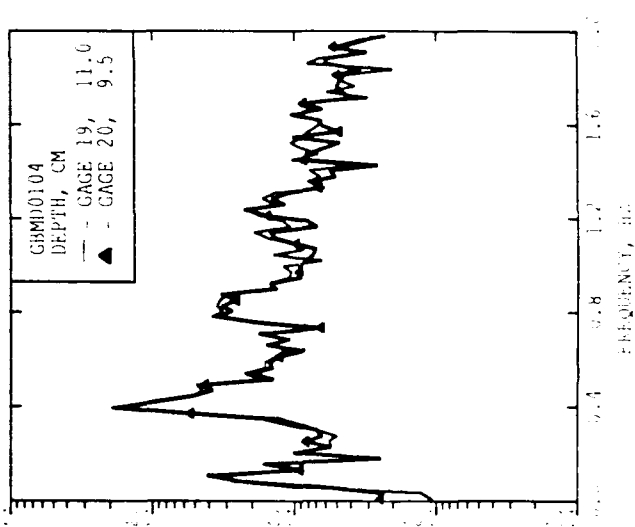
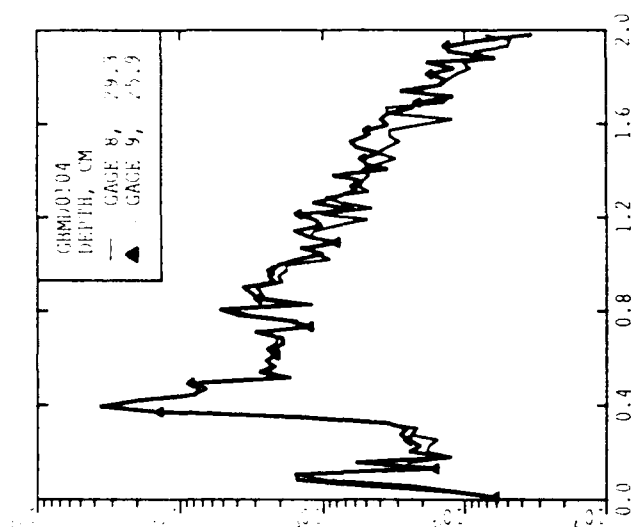
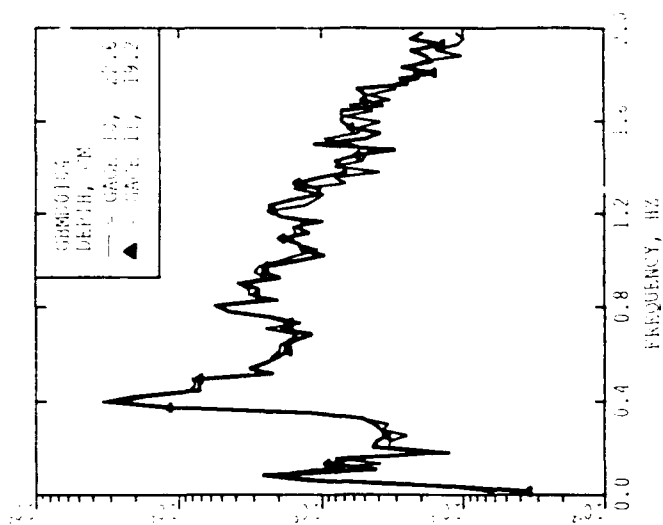


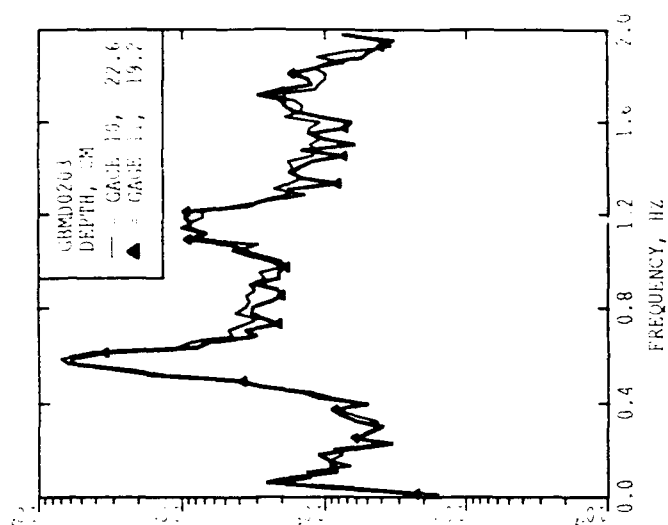
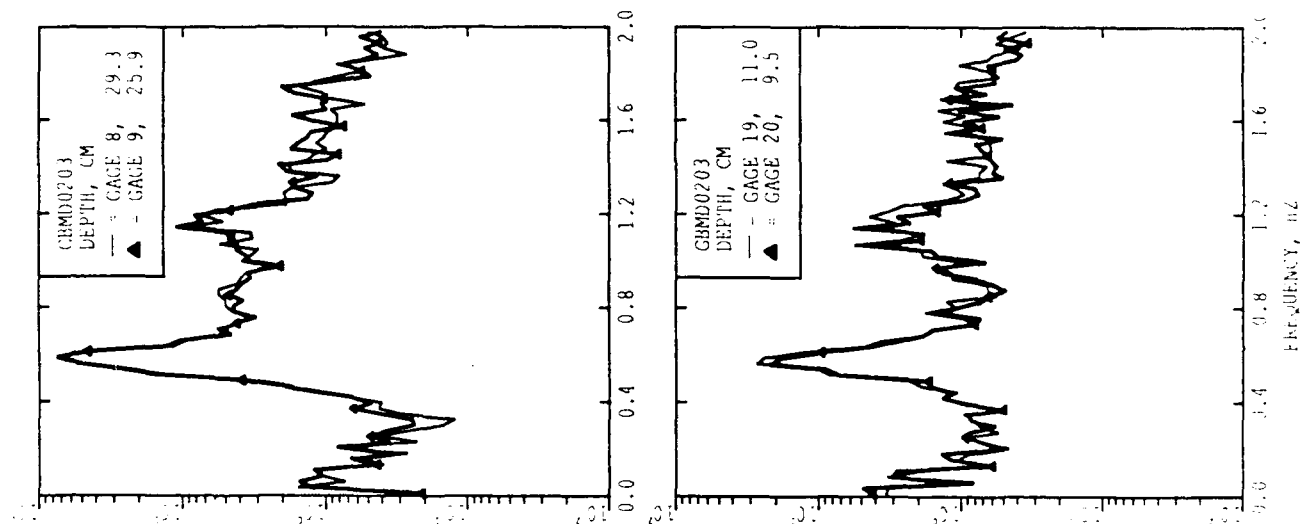
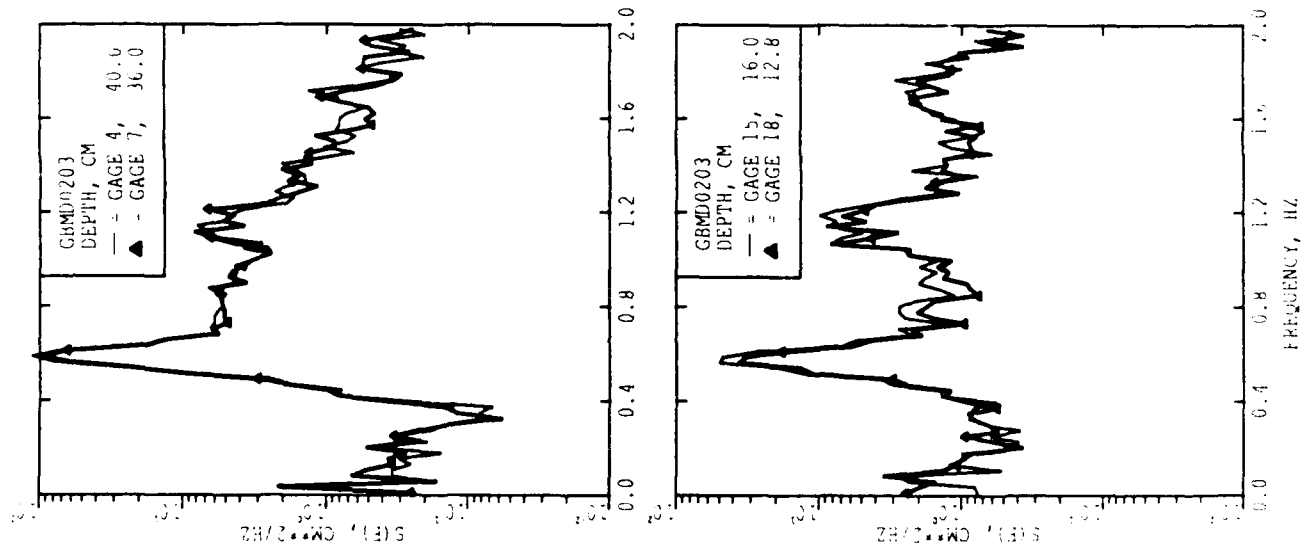












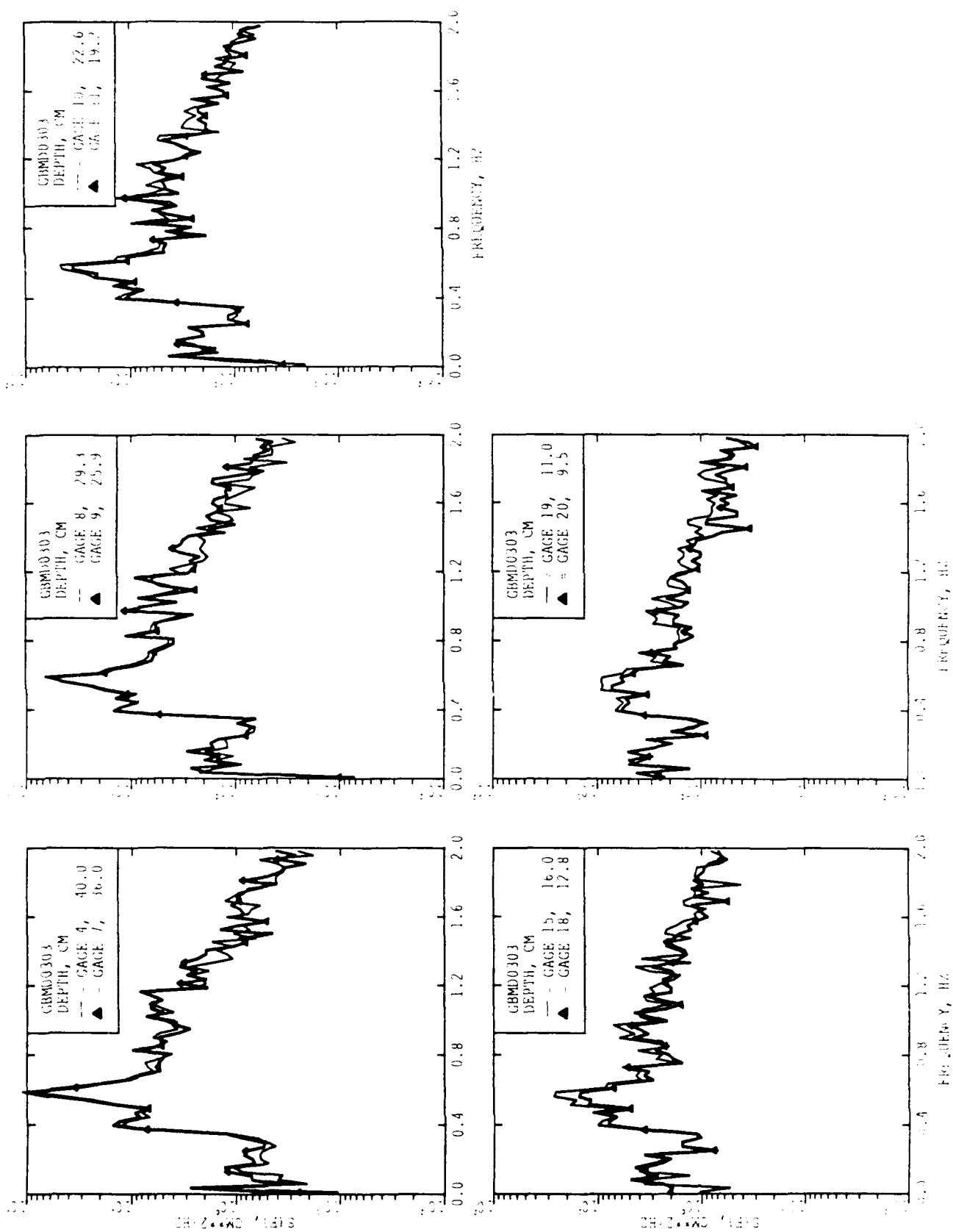
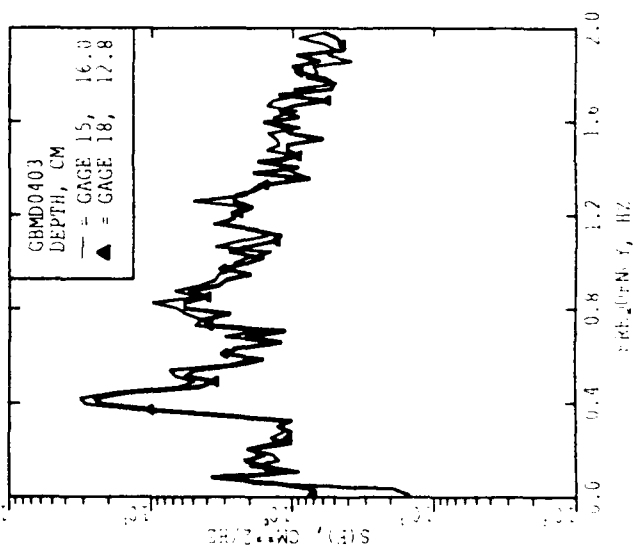
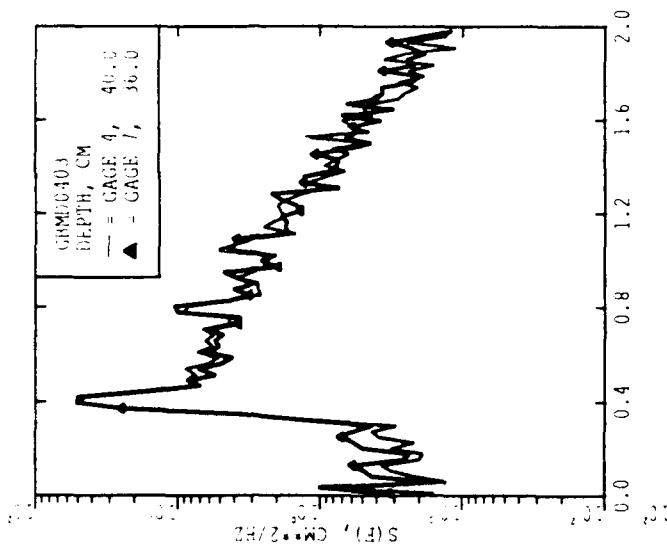
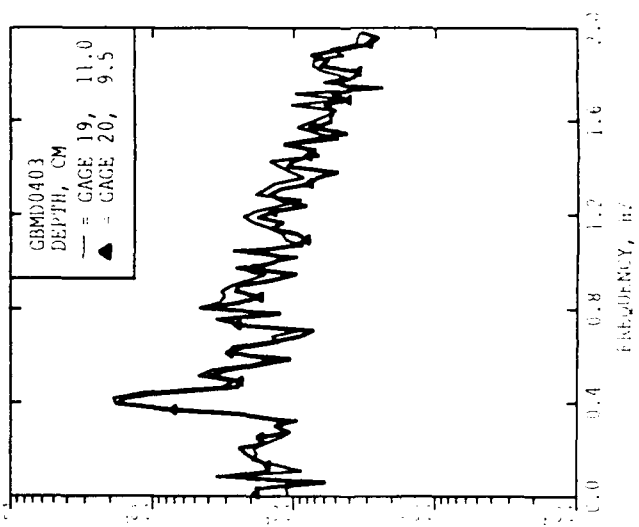
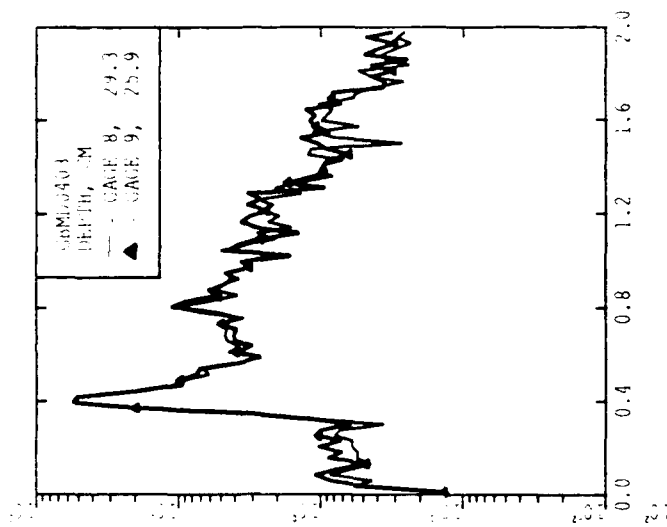
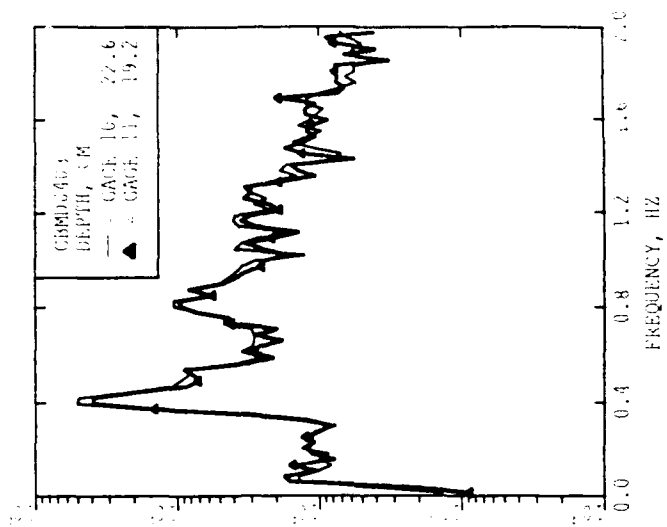
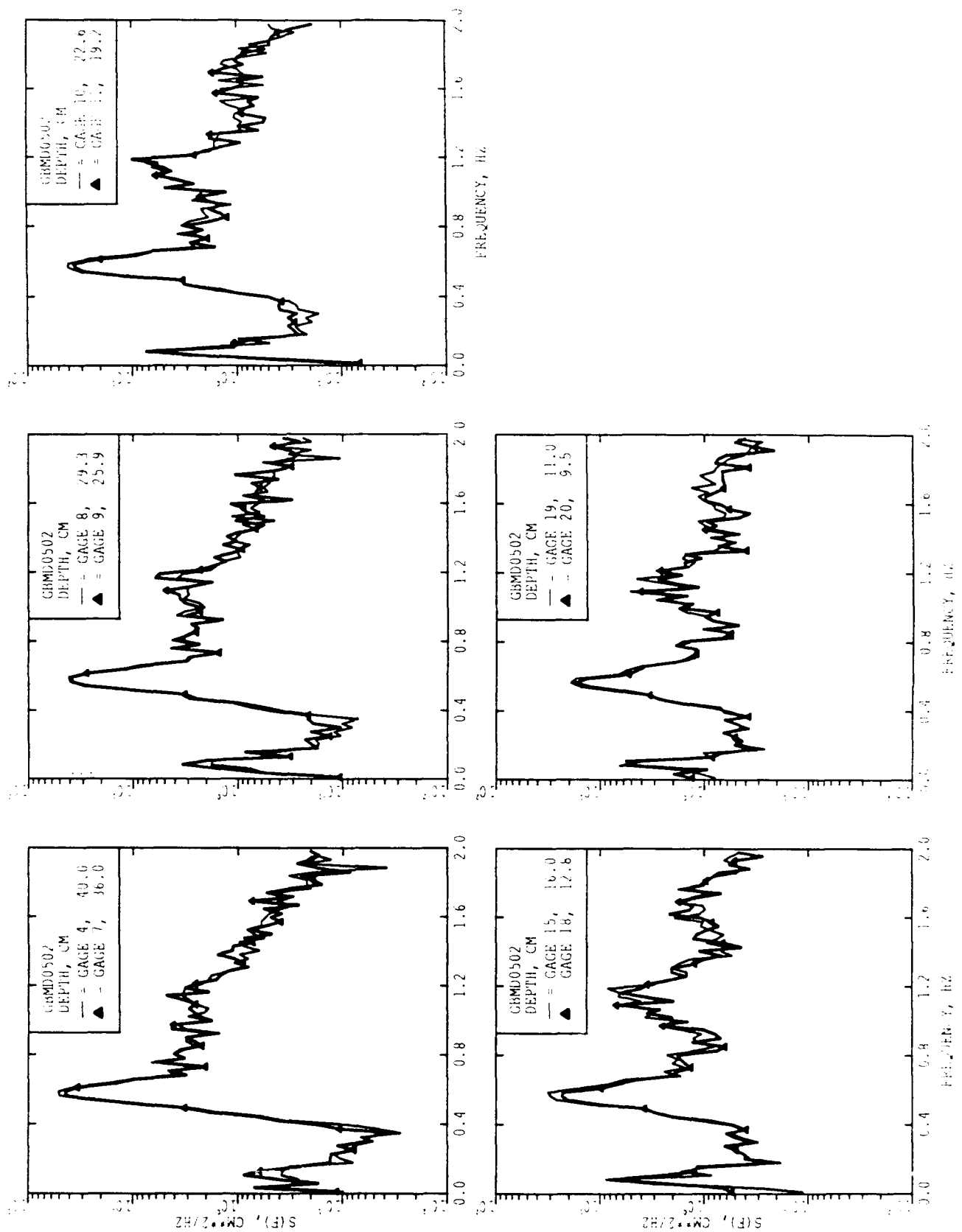
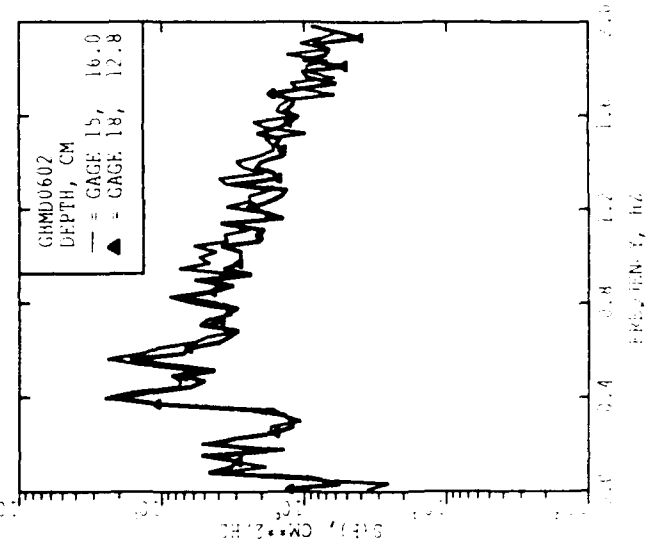
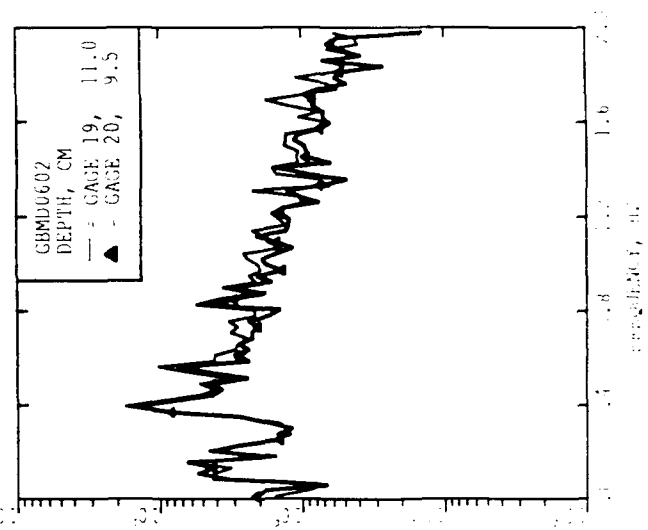
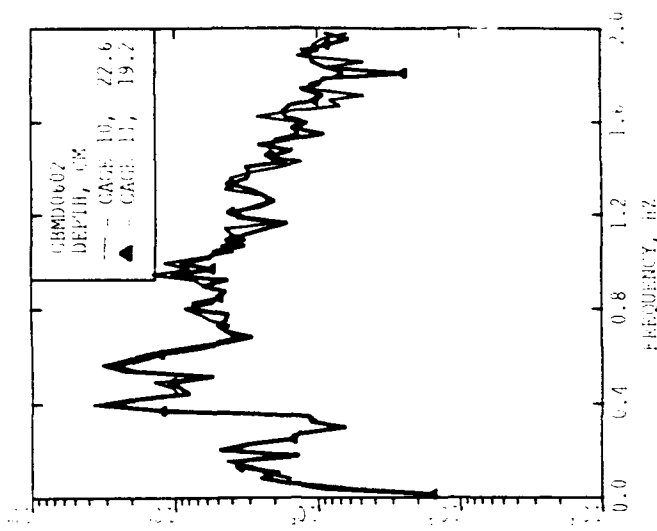
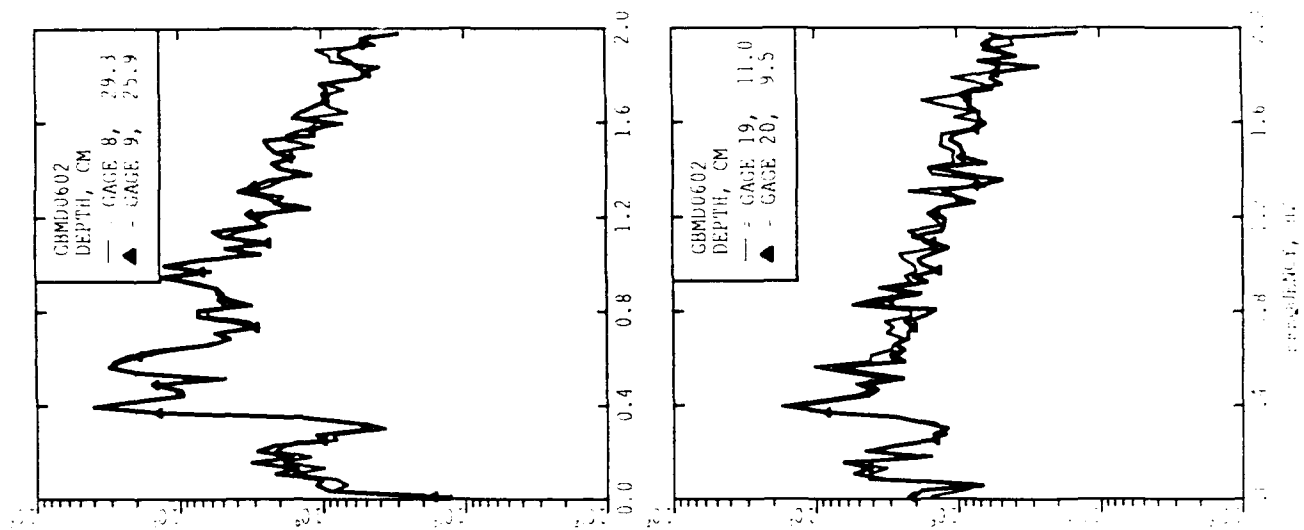
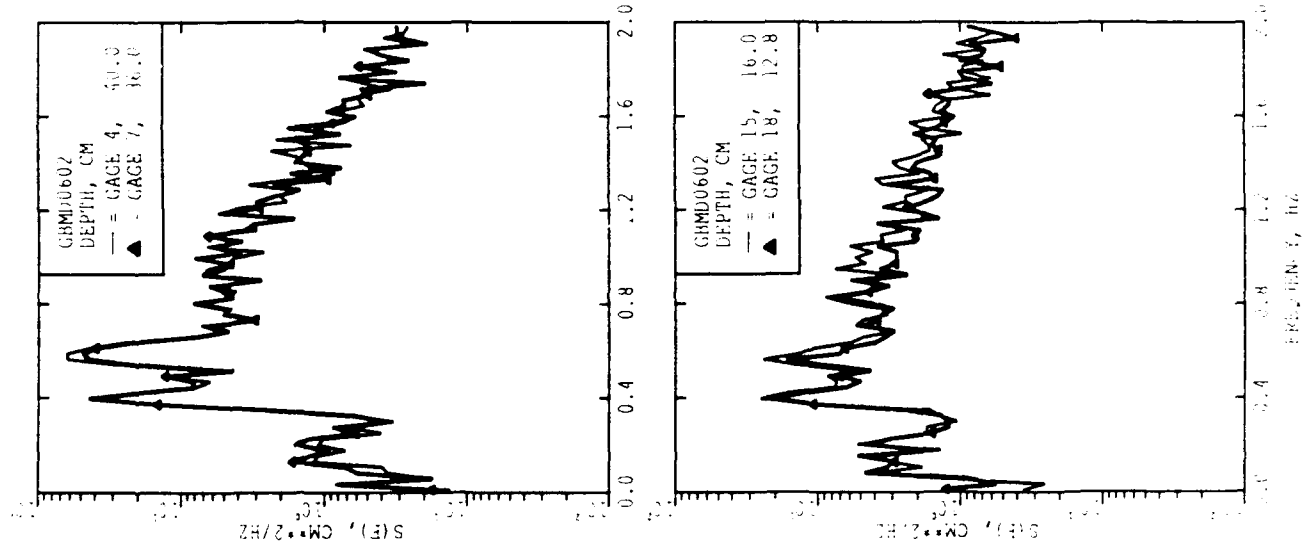


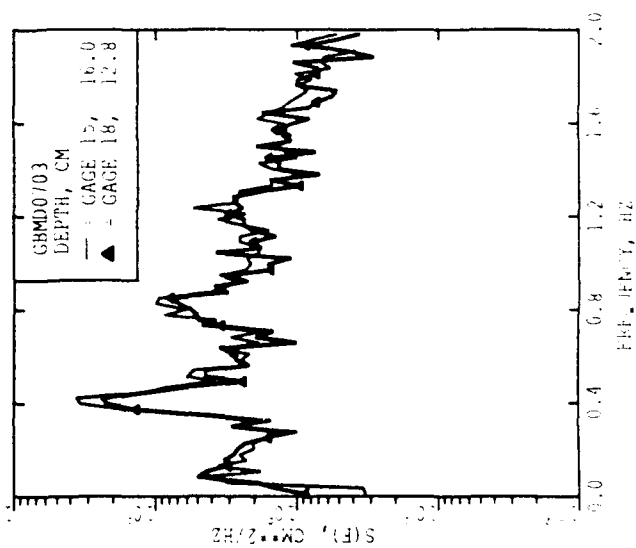
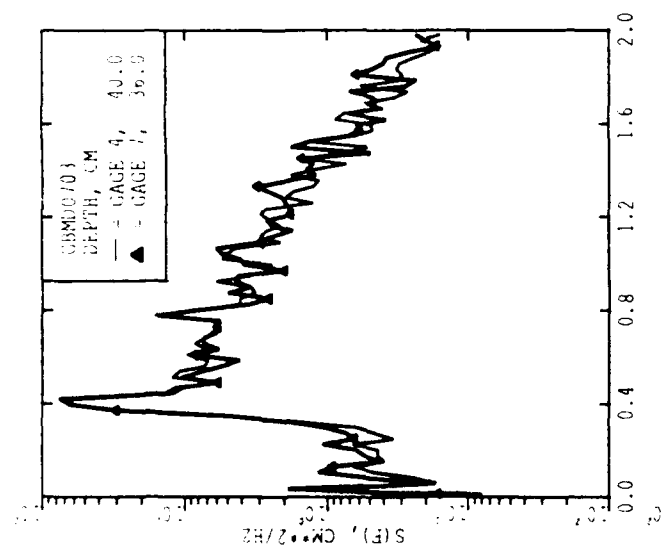
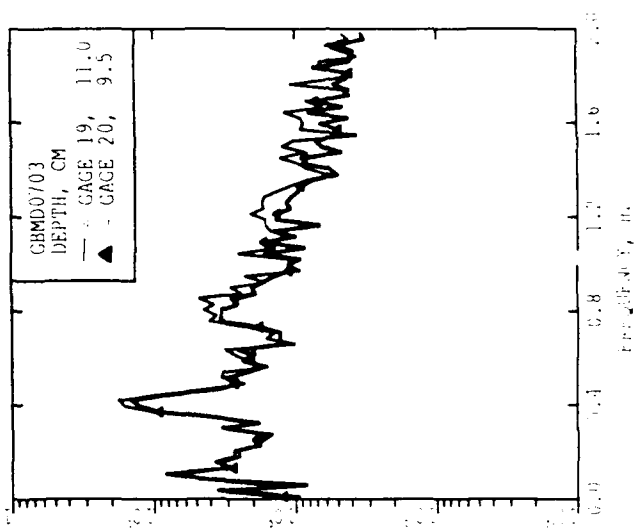
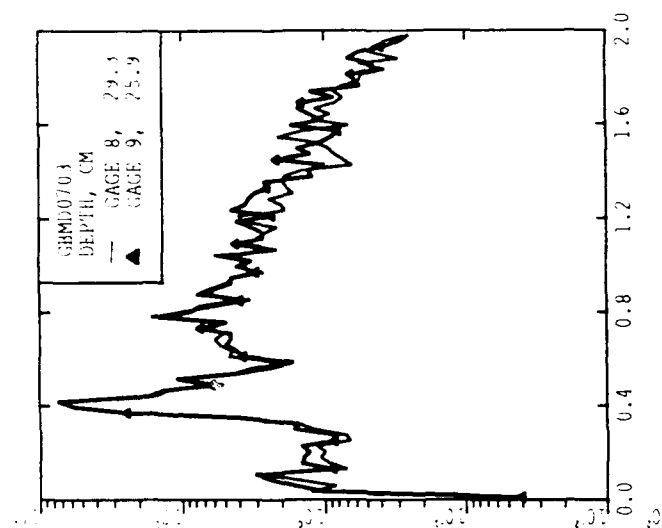
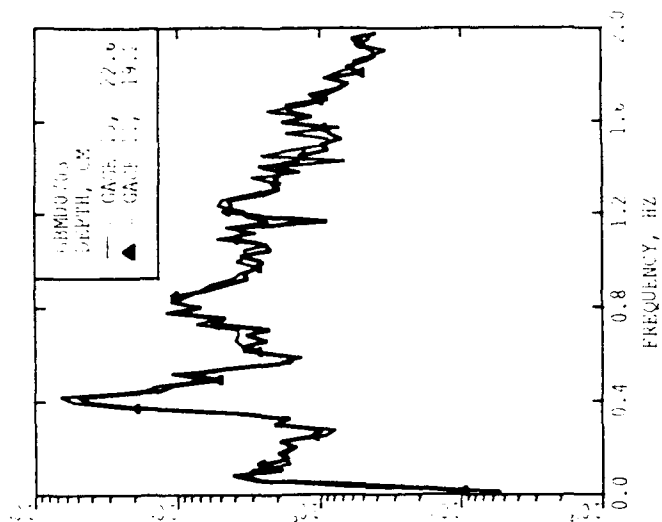
FIG. 30B- Y, Hz

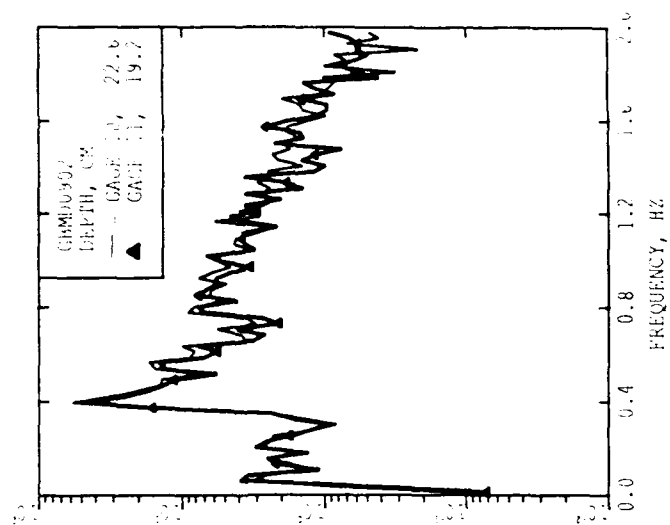
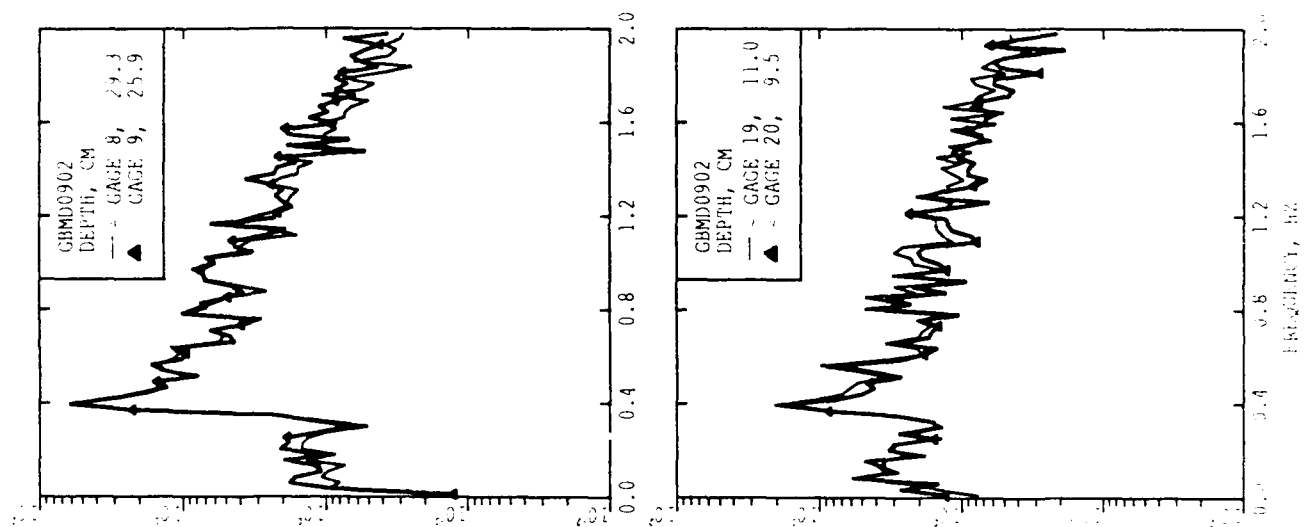
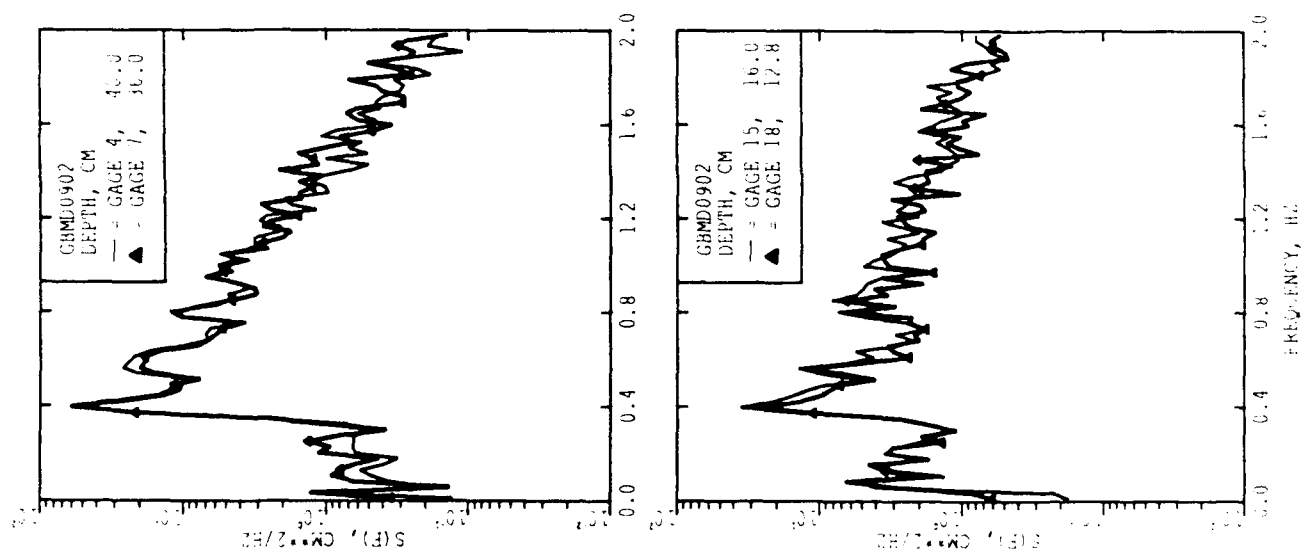


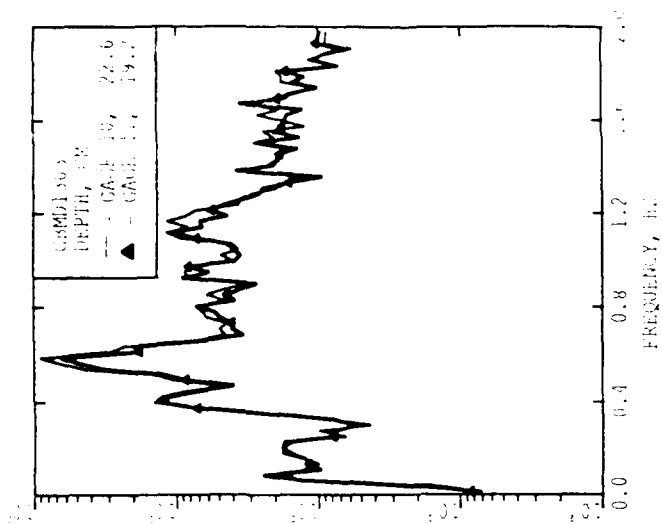
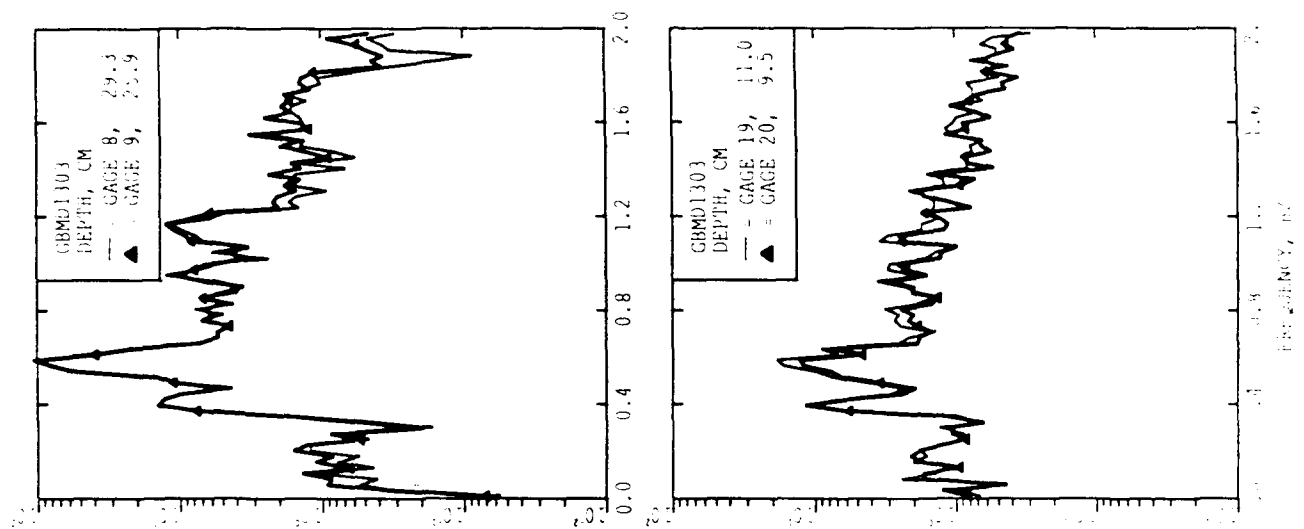
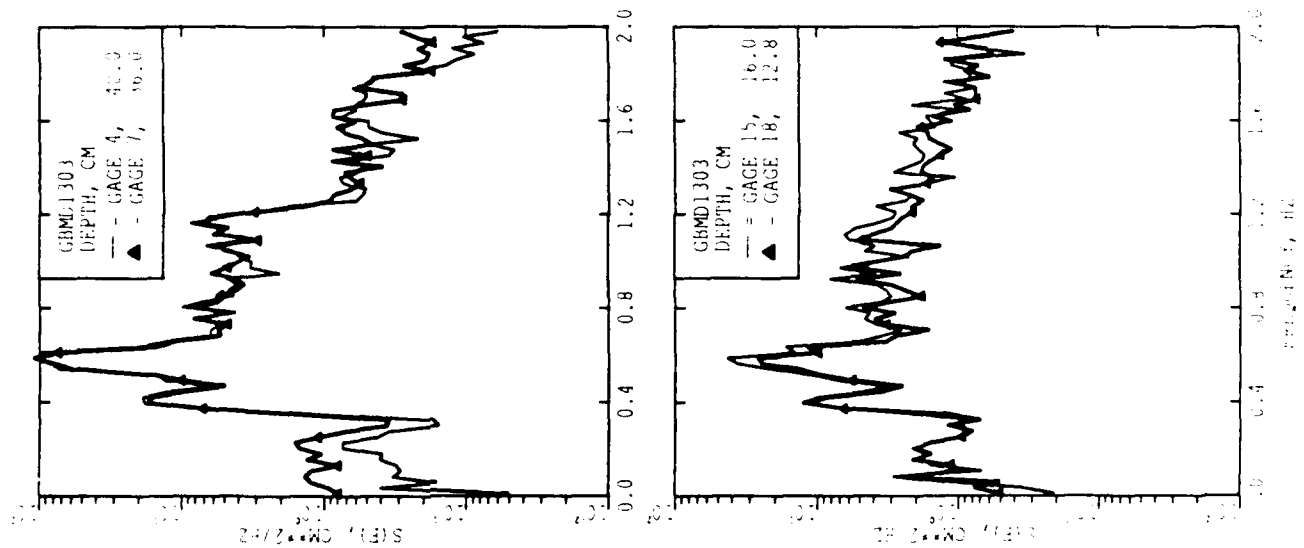


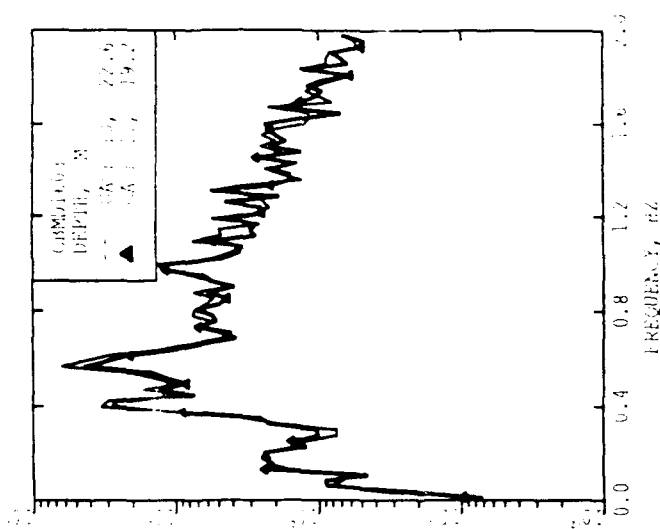
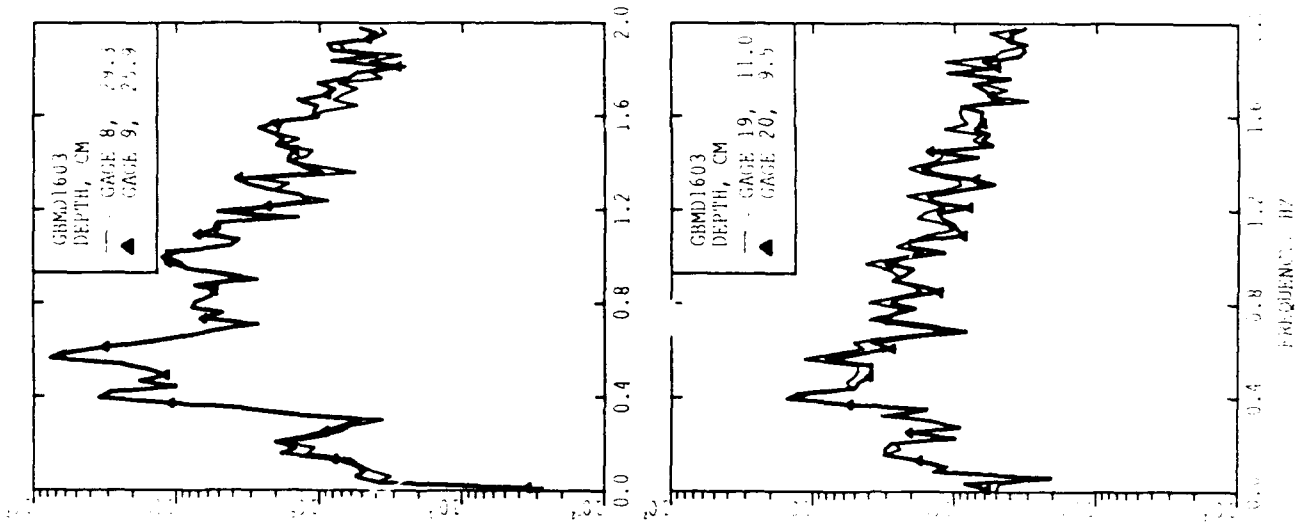
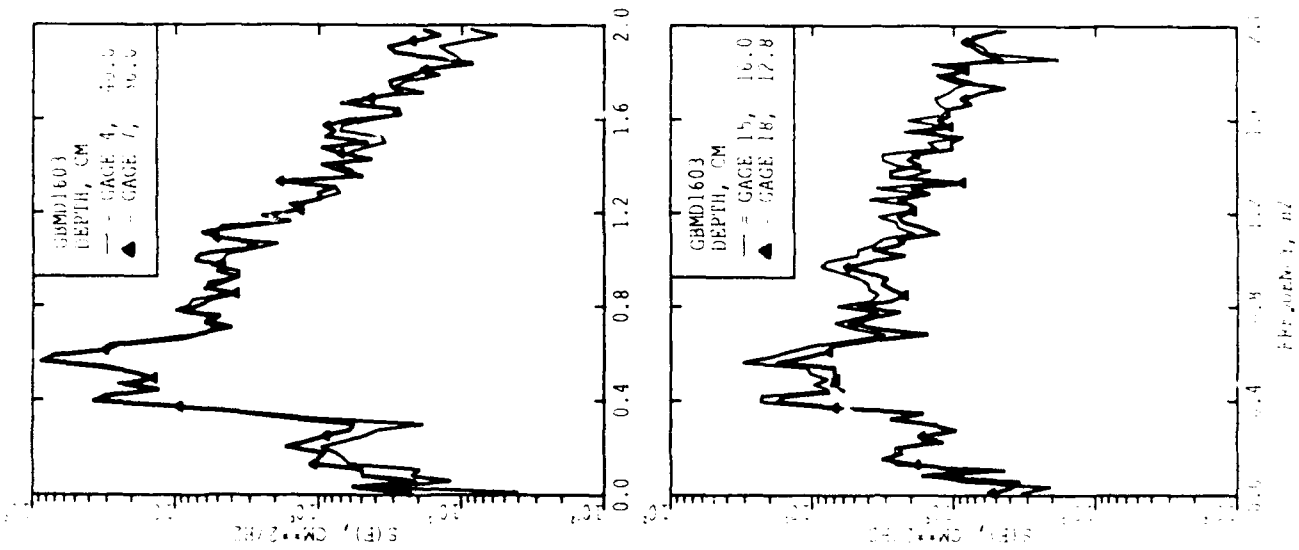


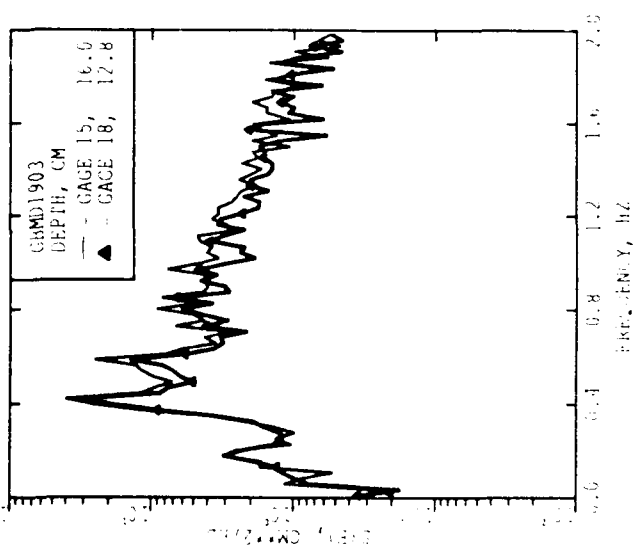
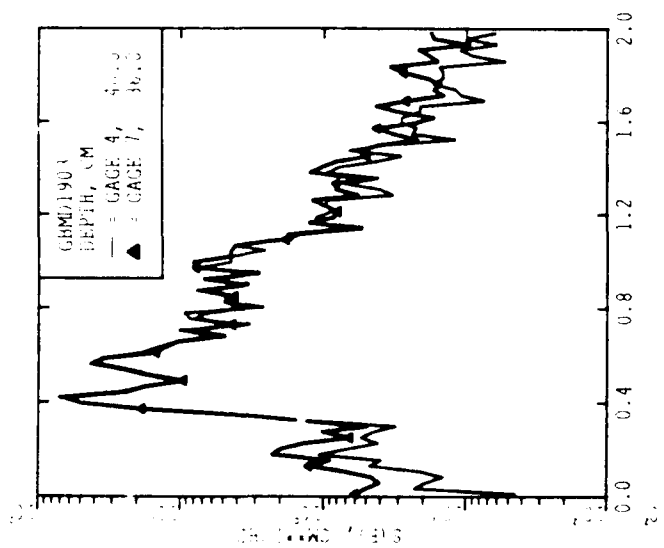
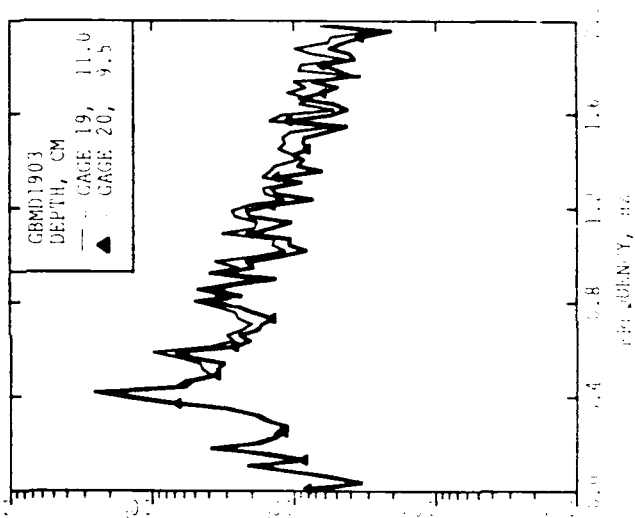
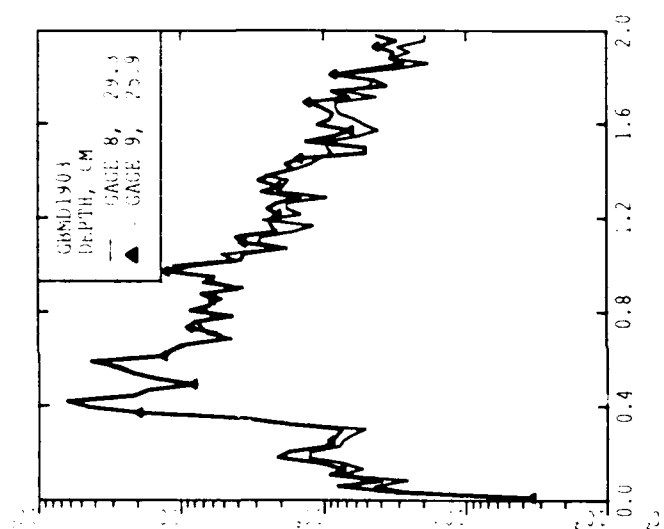
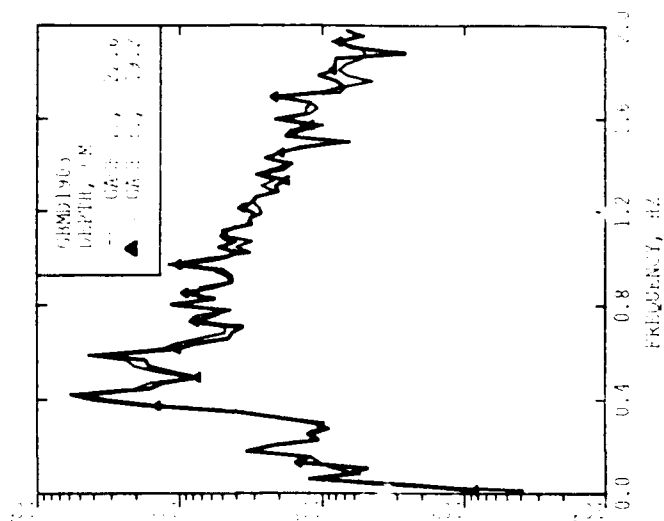


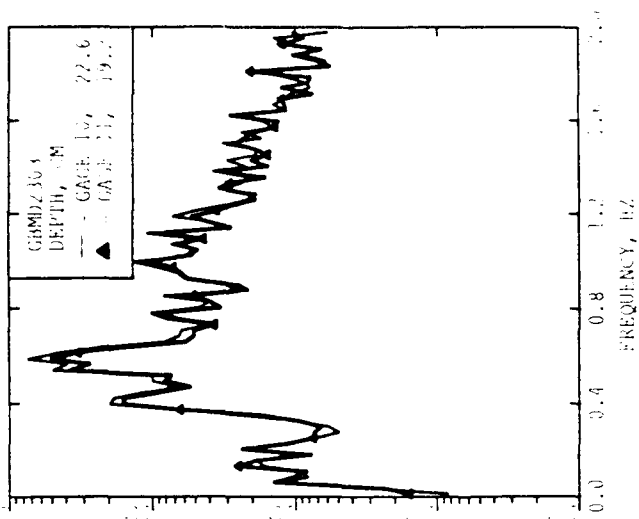
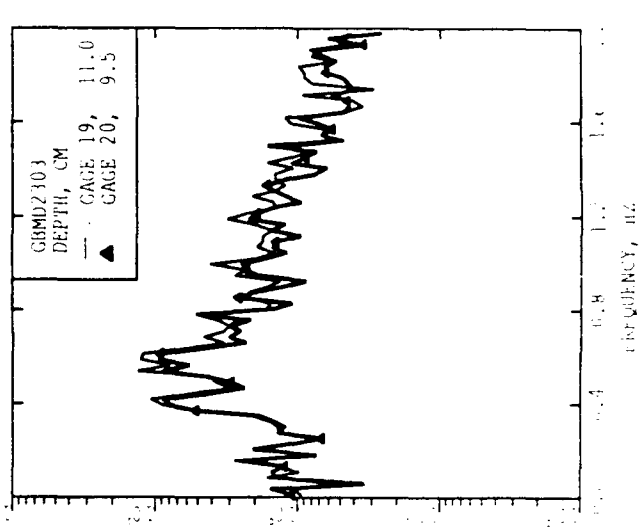
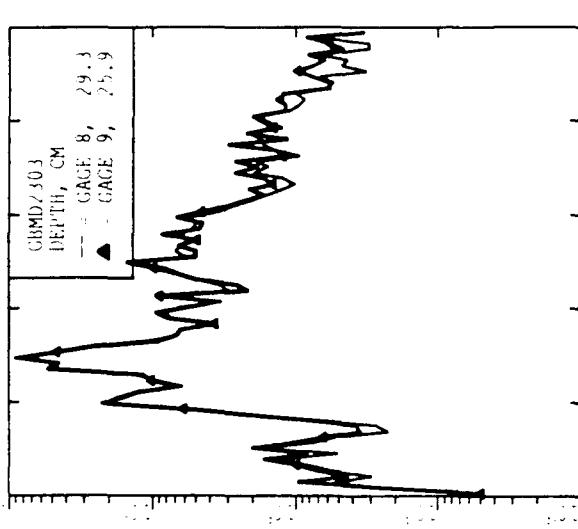
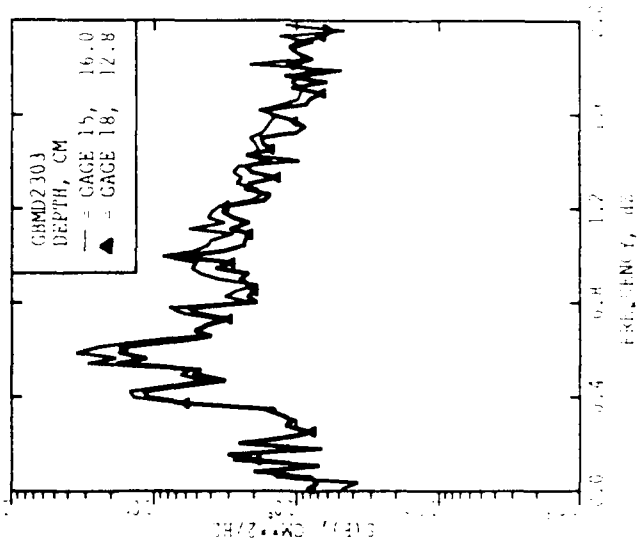
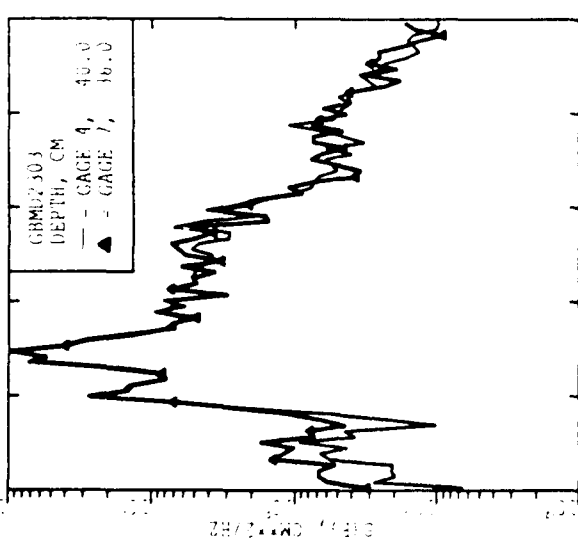




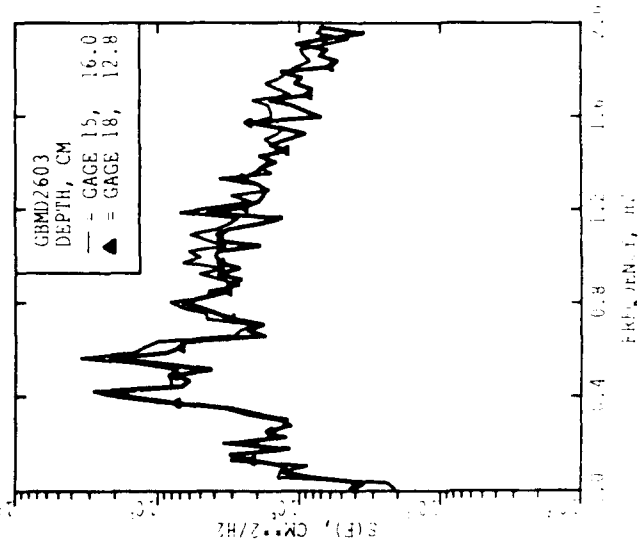
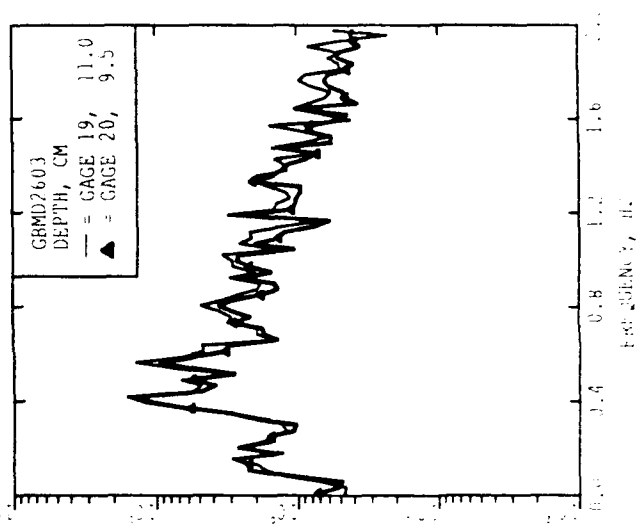
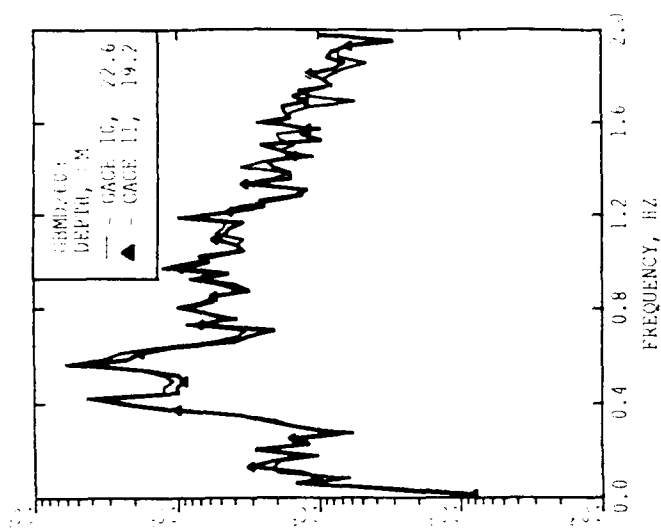
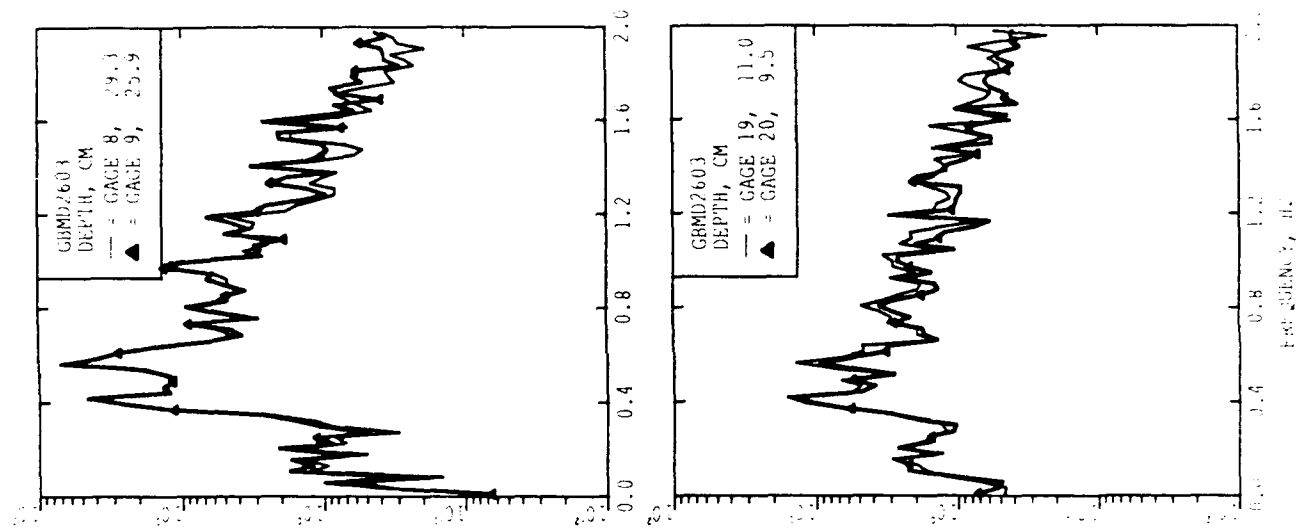
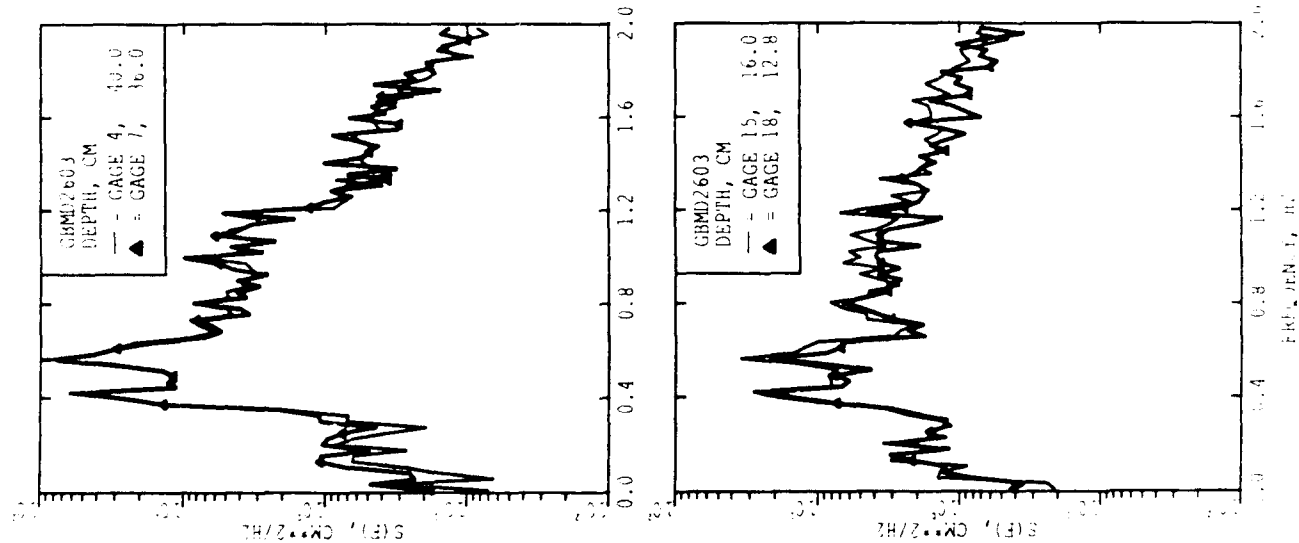


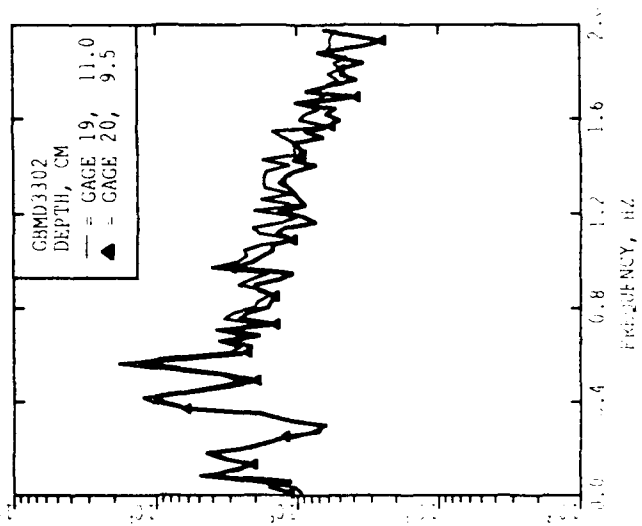
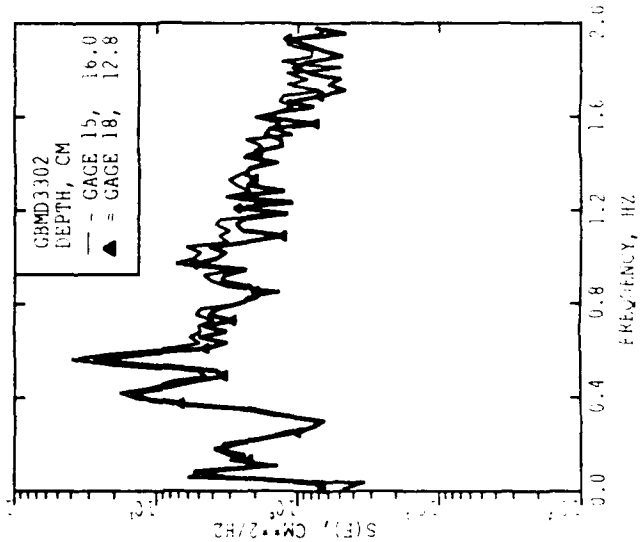
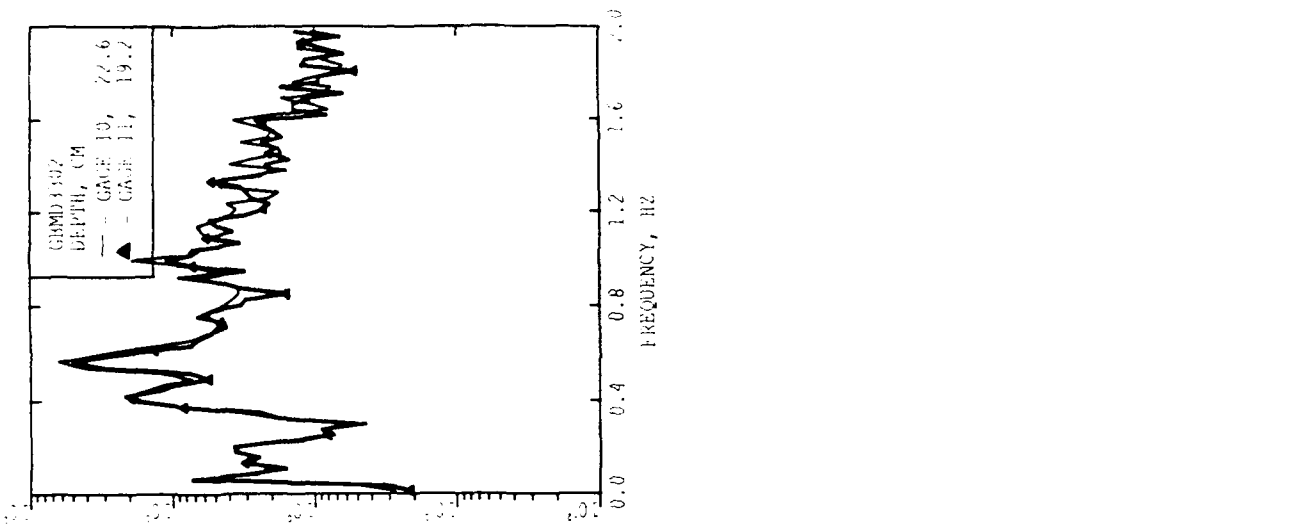
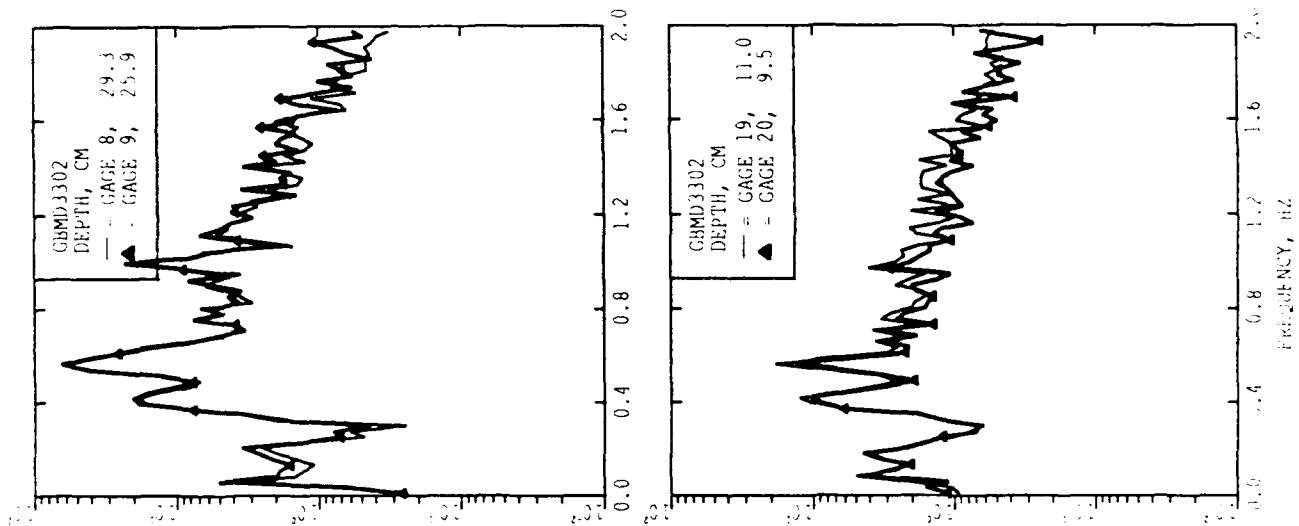
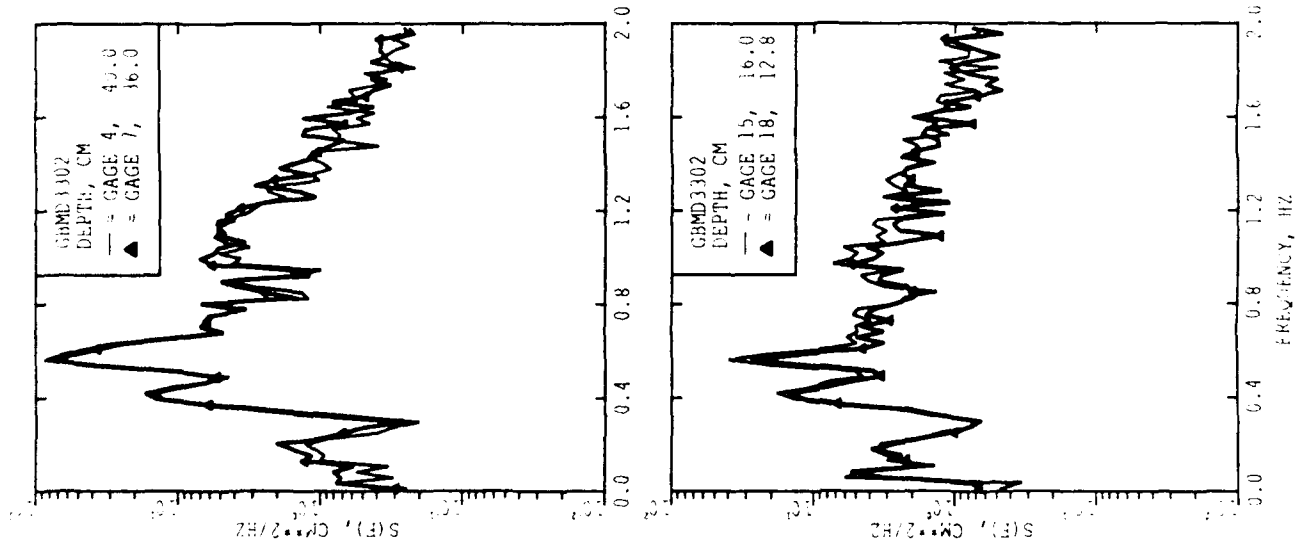


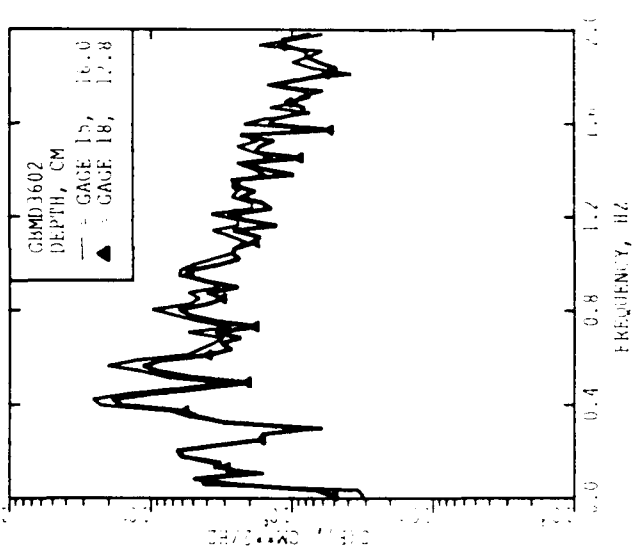
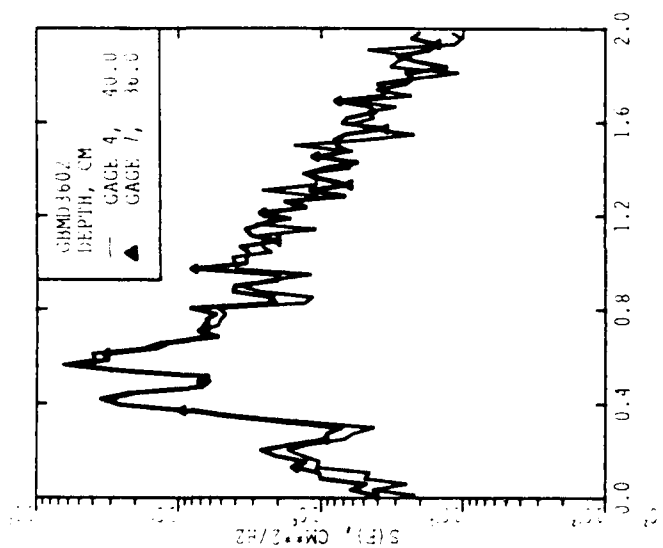
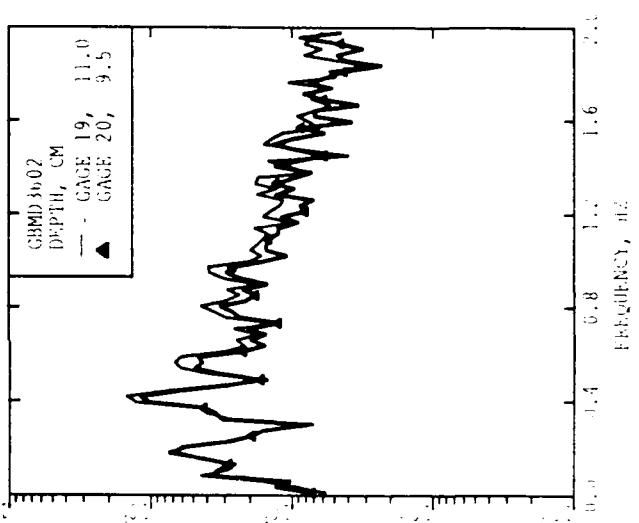
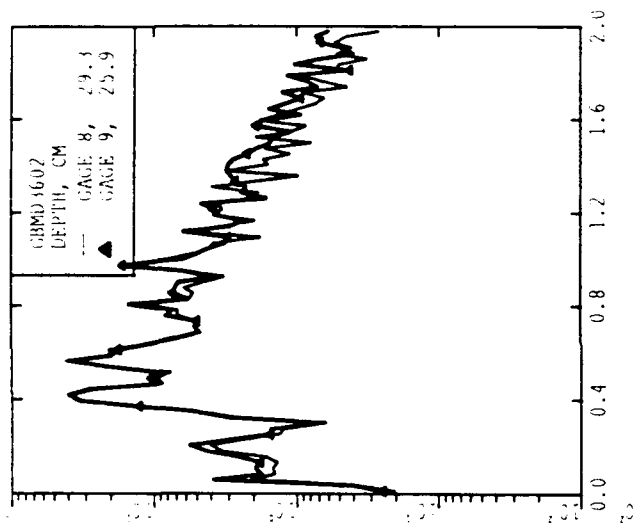
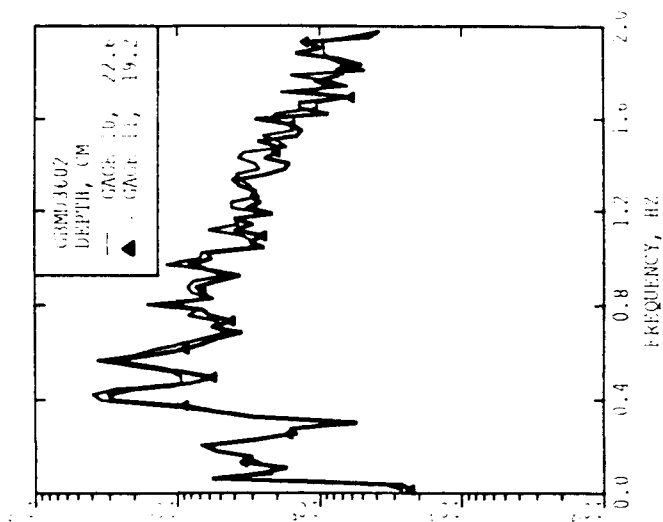


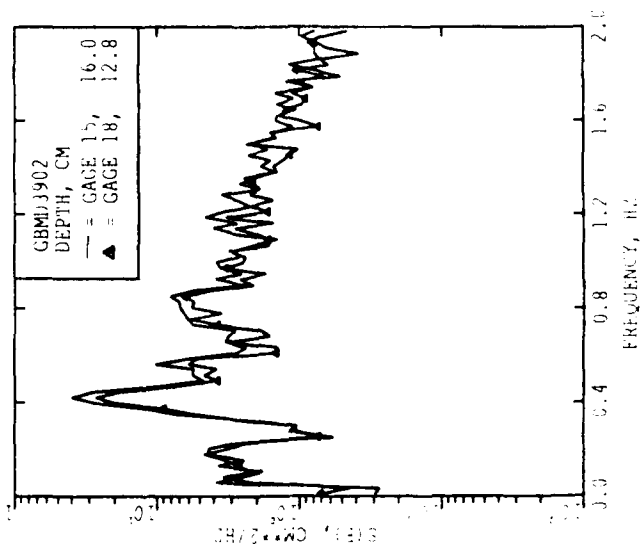
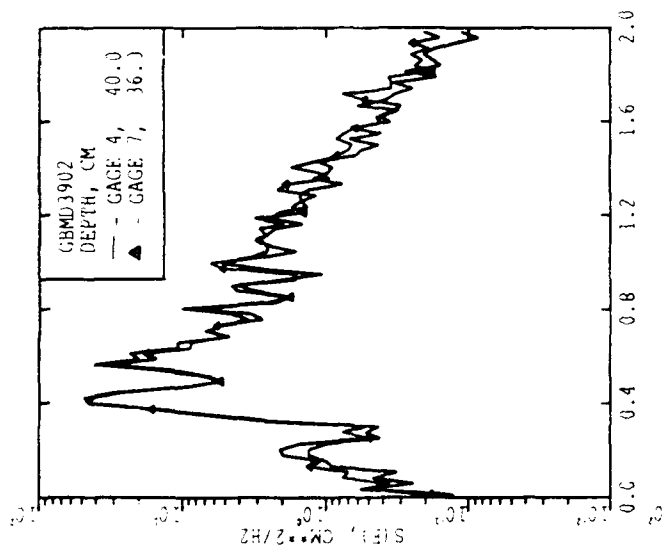
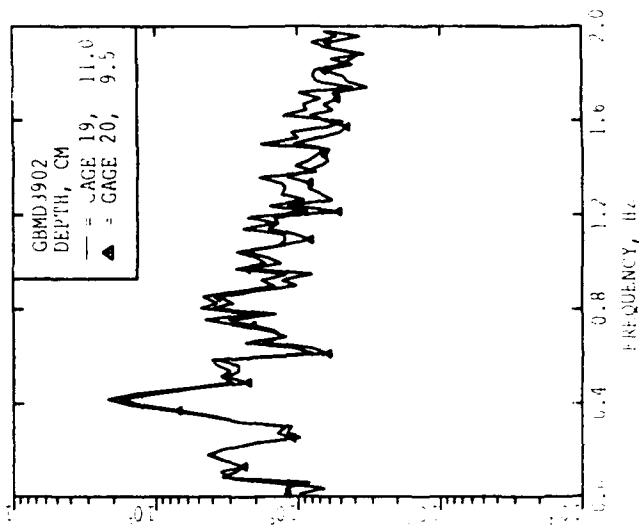
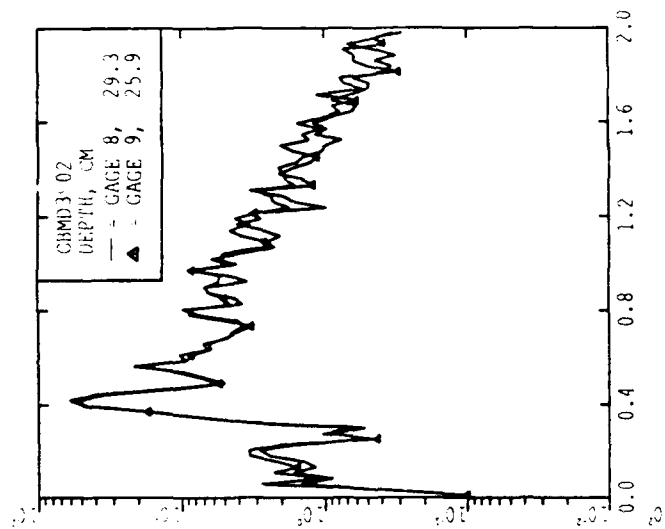
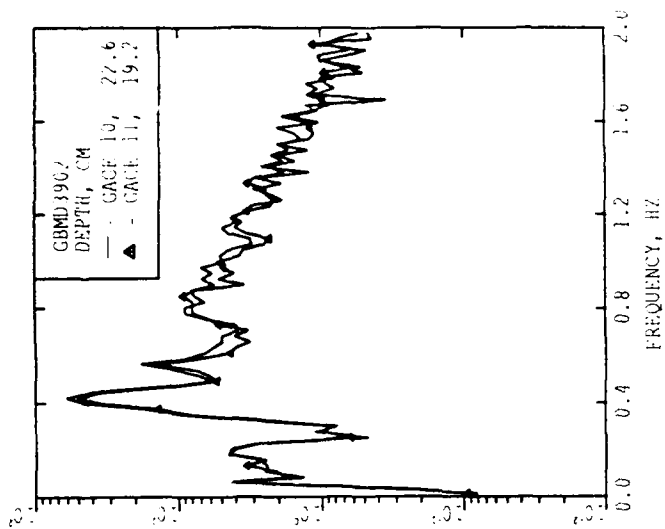


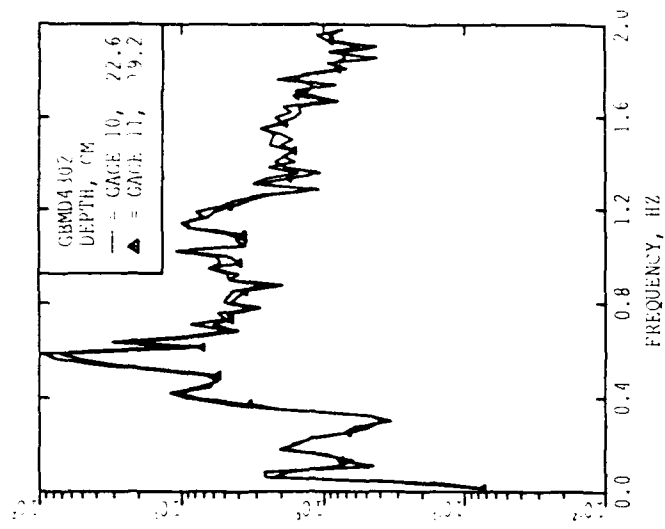
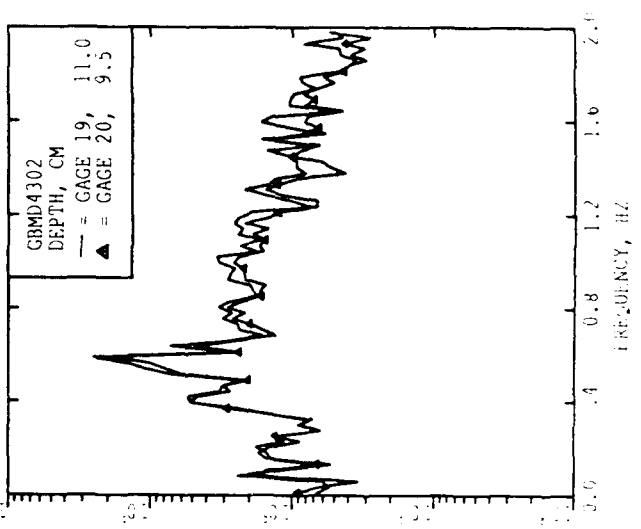
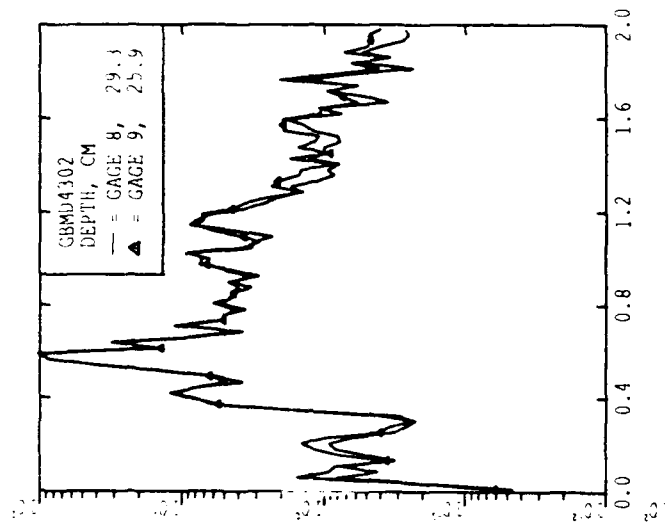
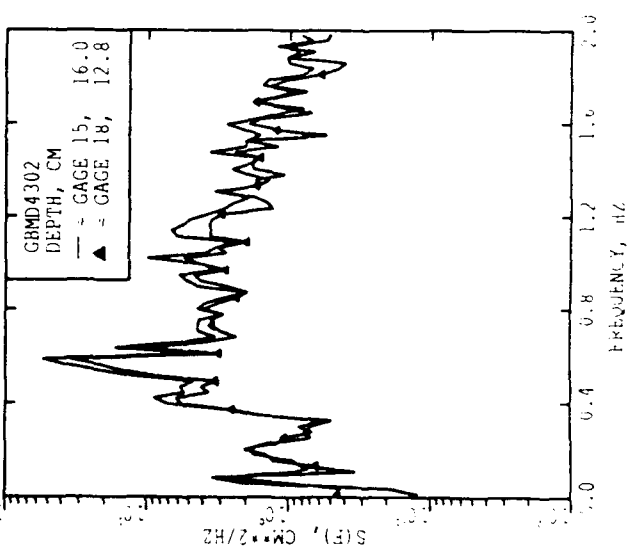
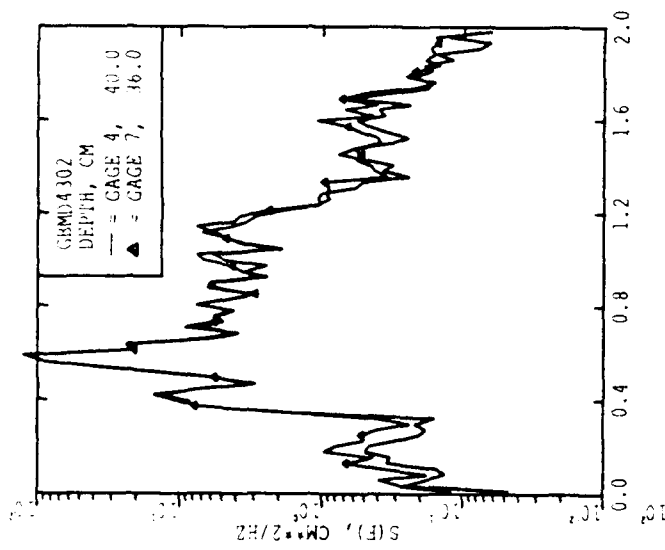


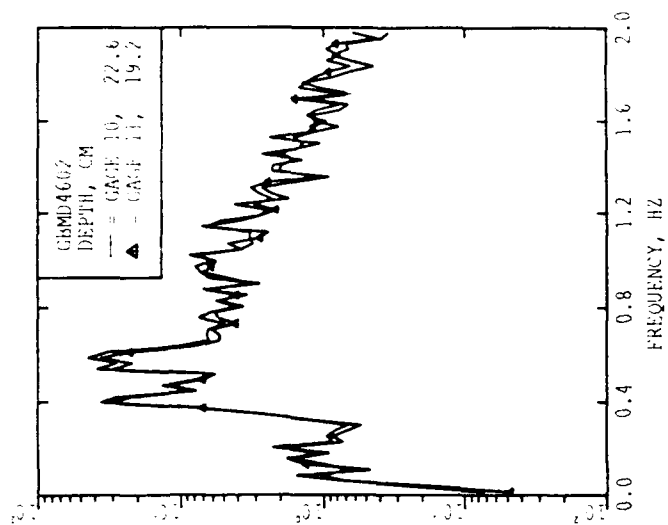
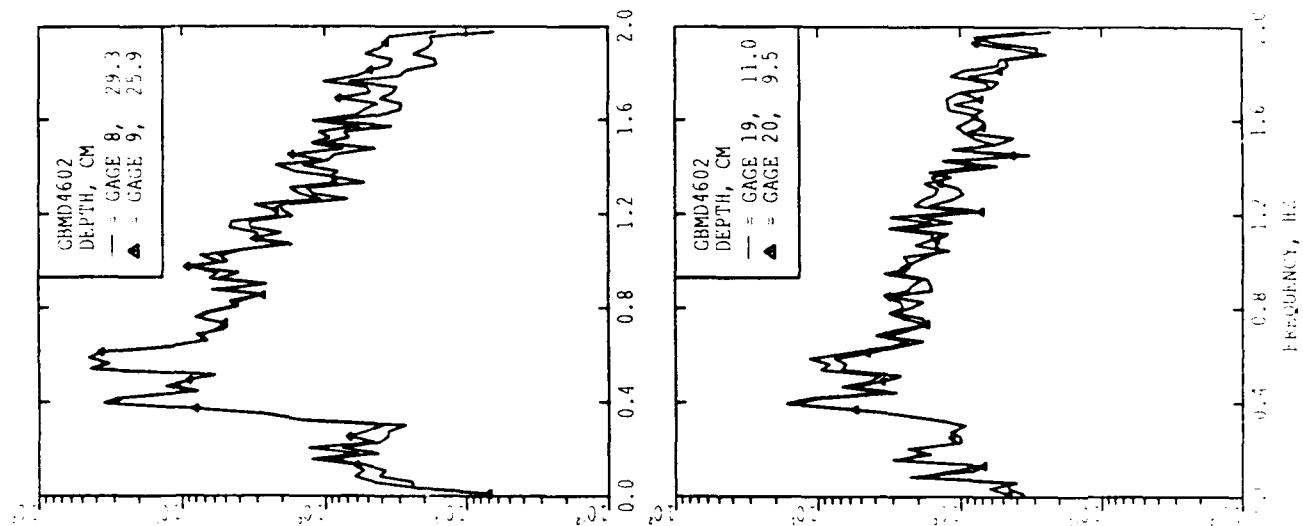
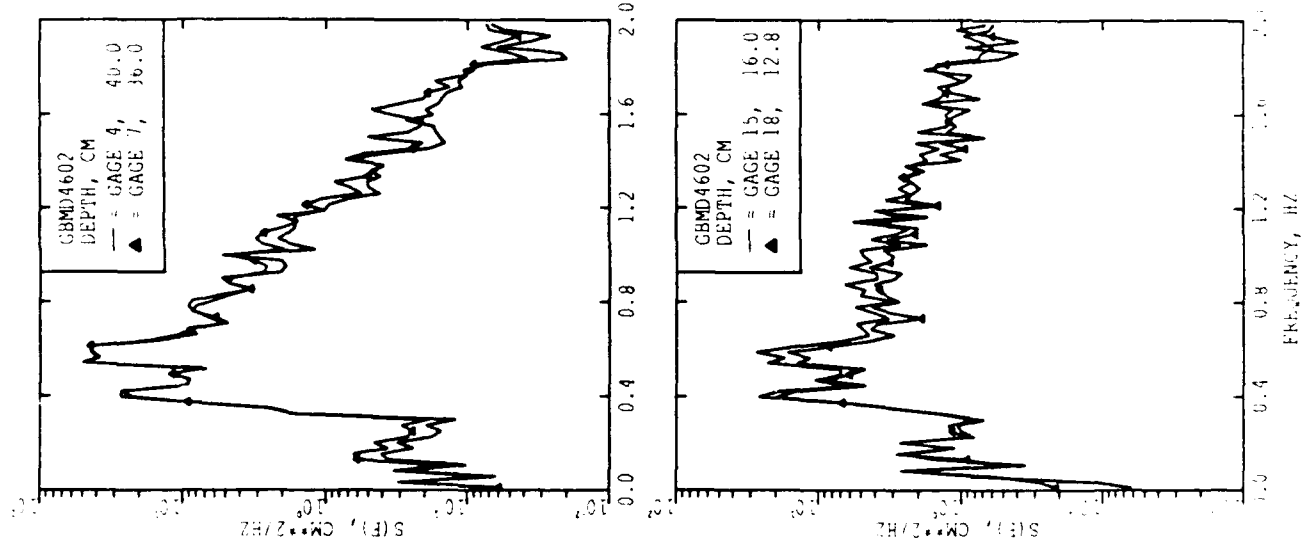


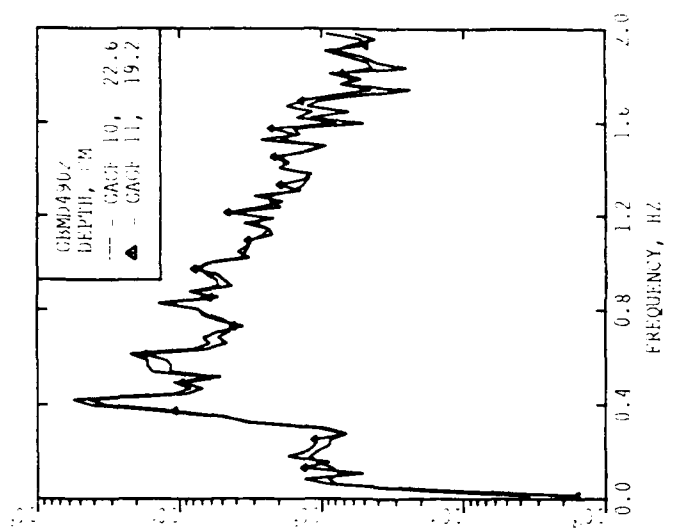
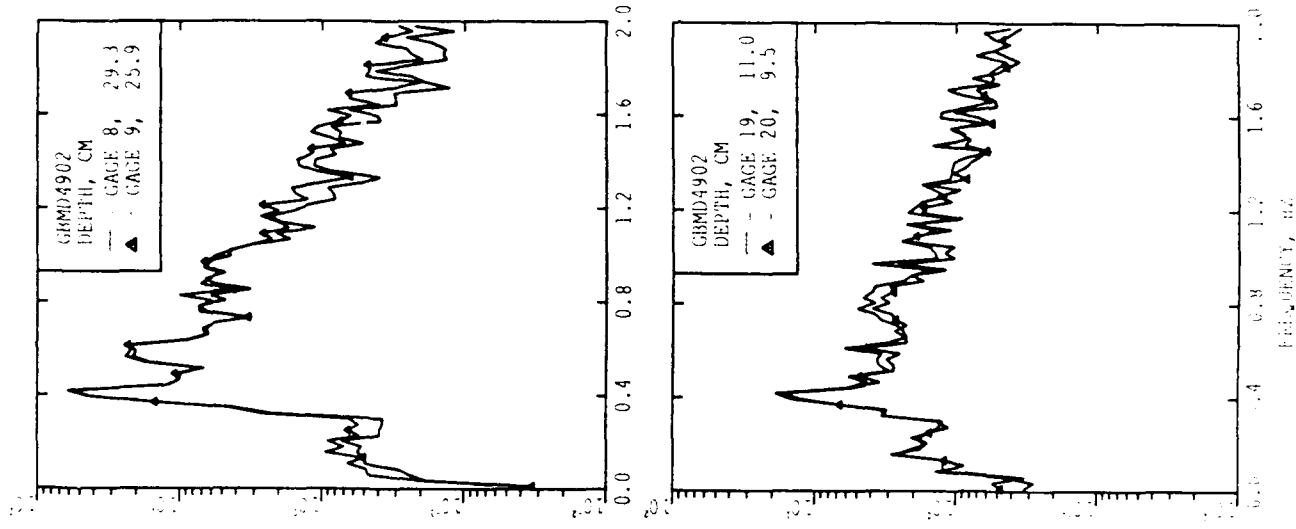
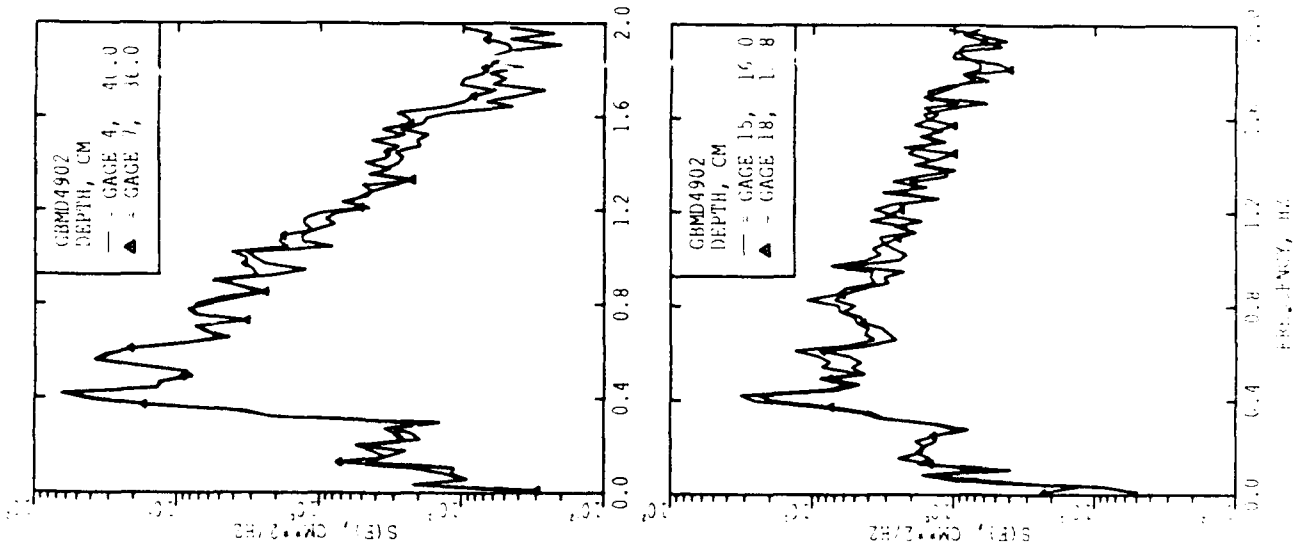


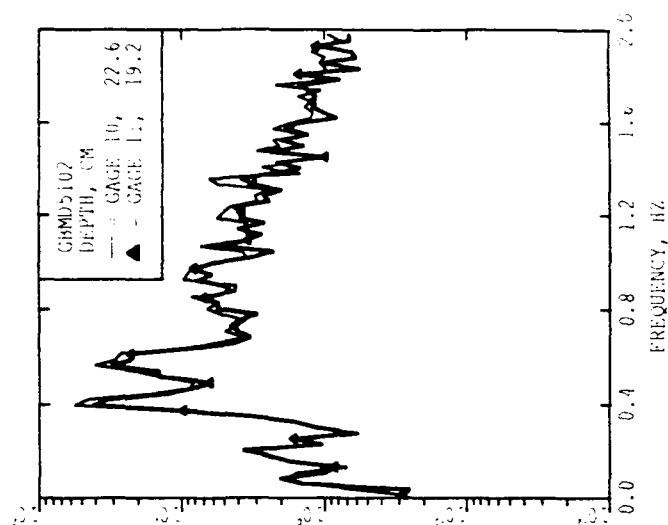
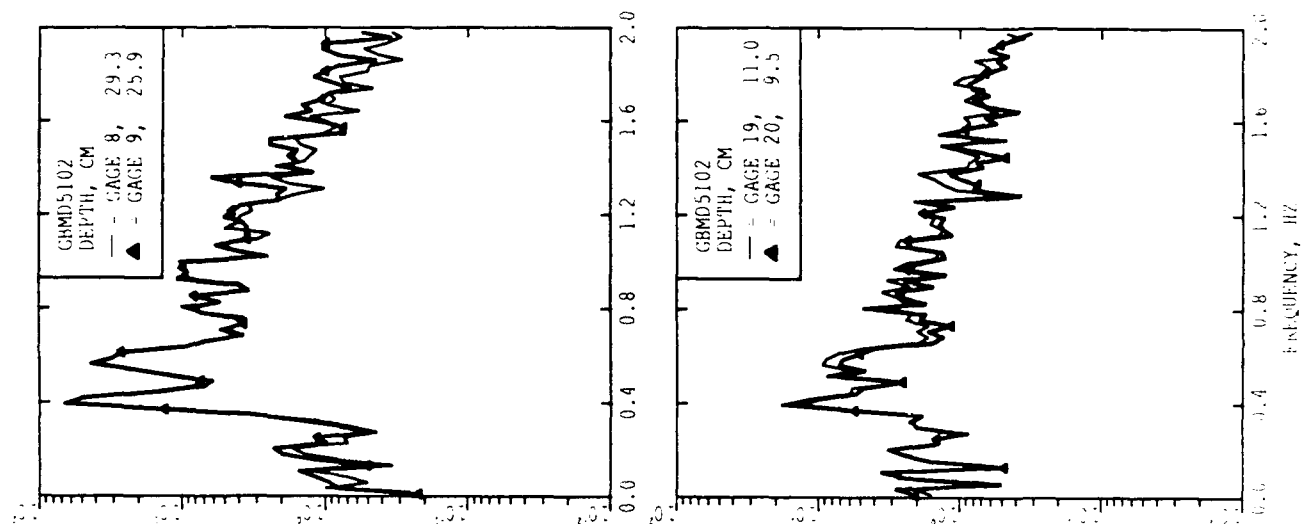
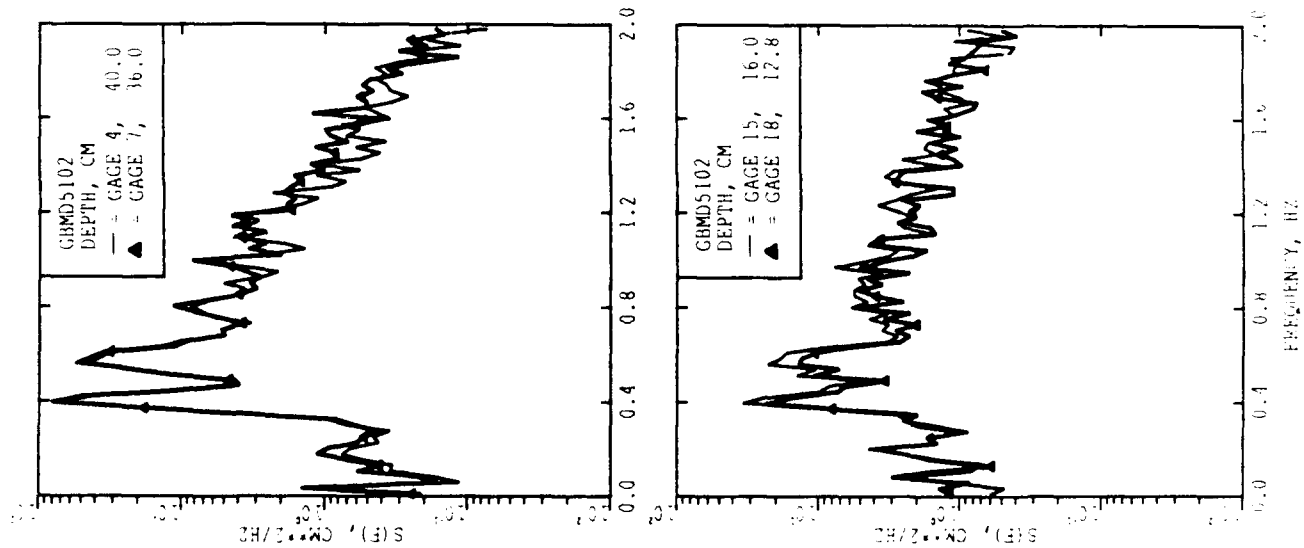




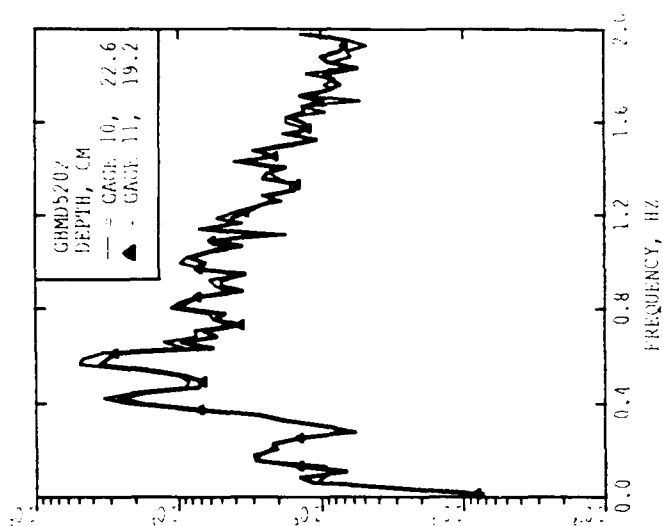
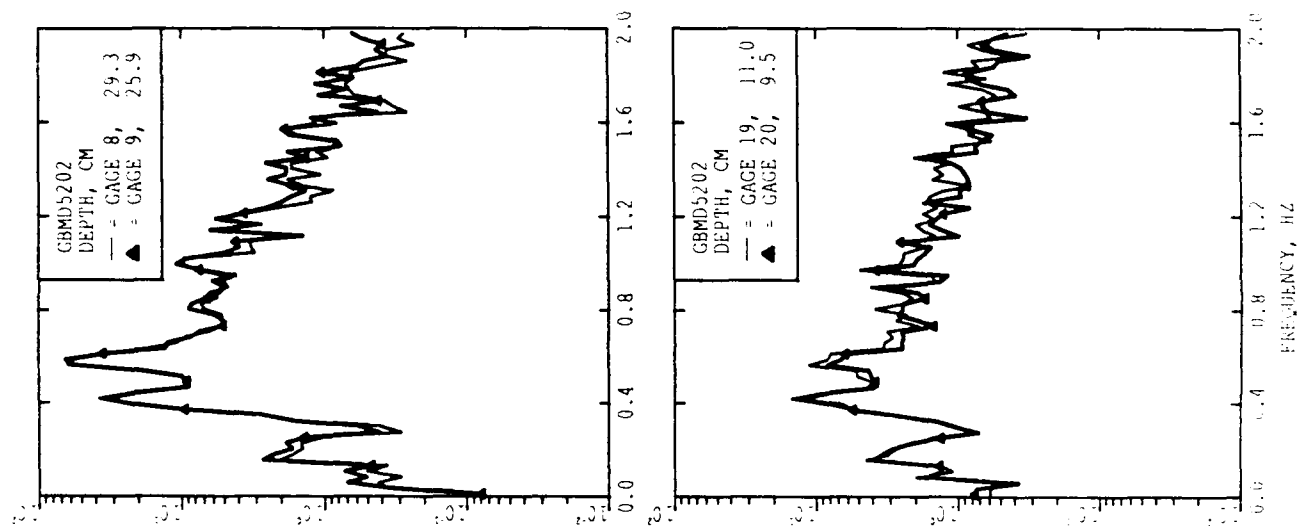
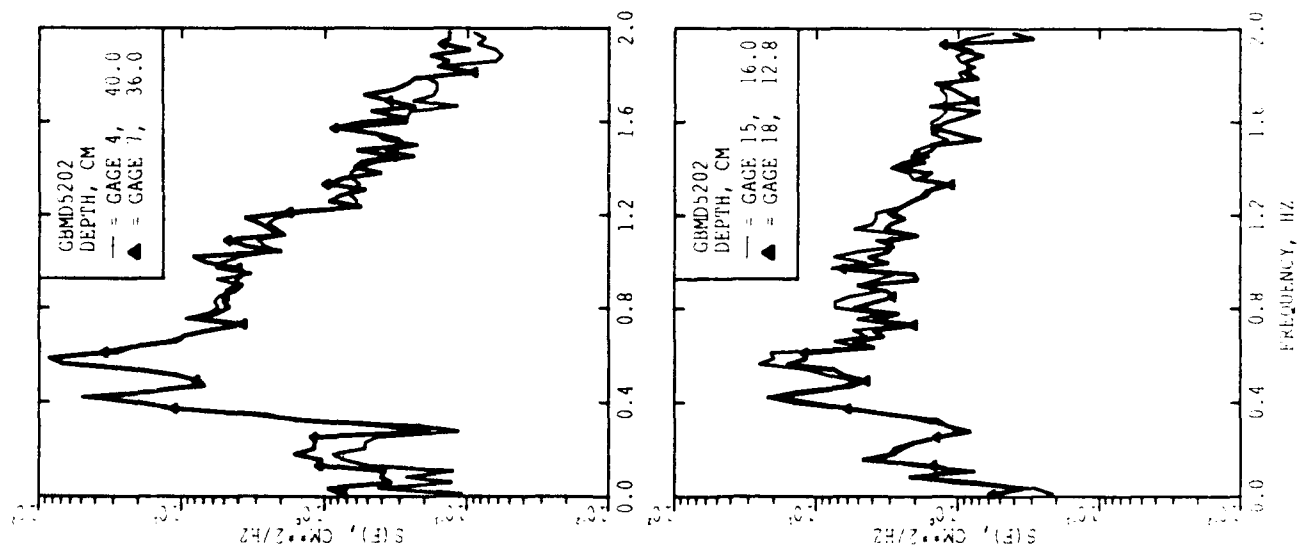


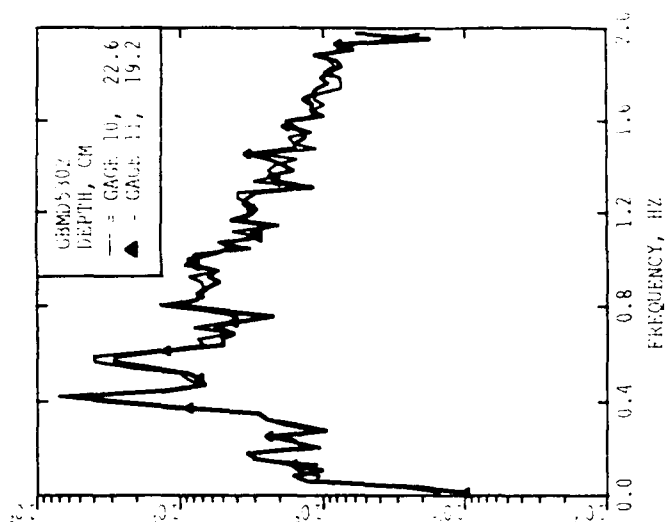
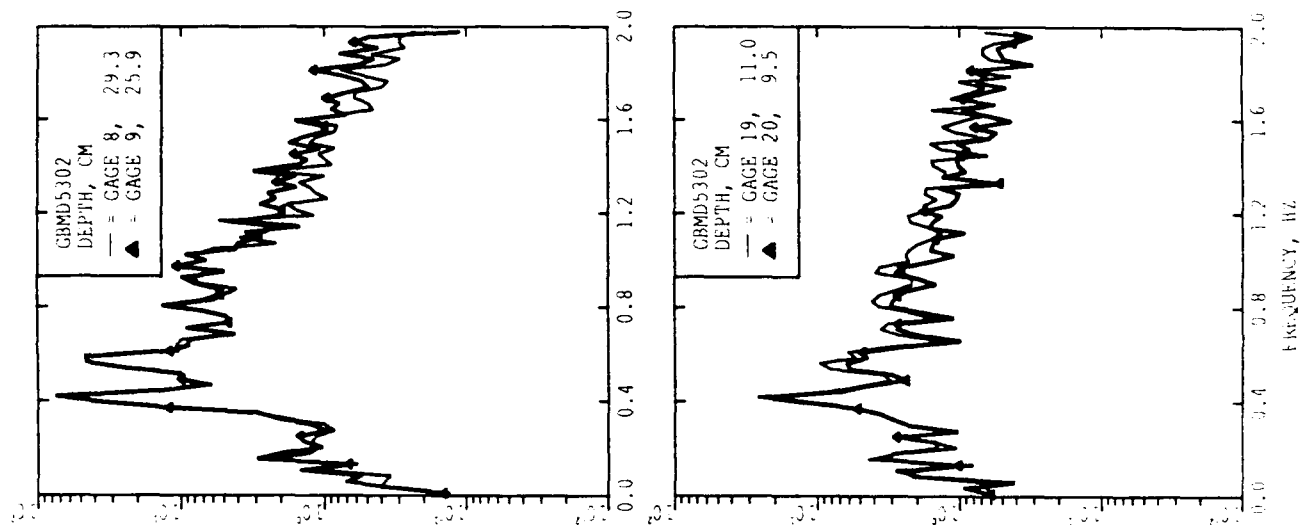
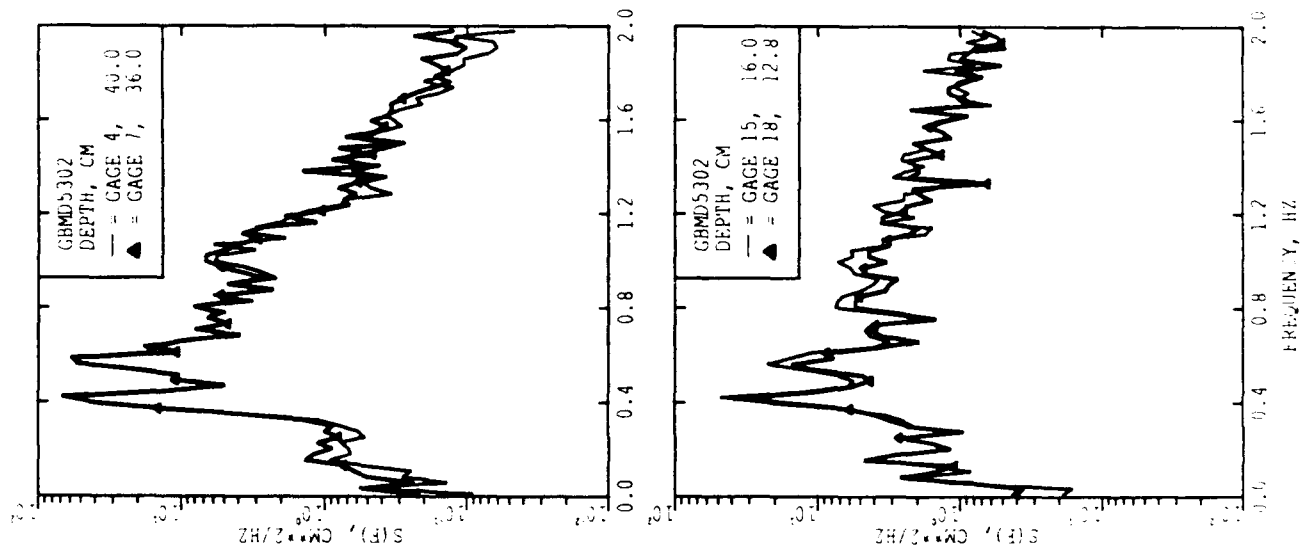


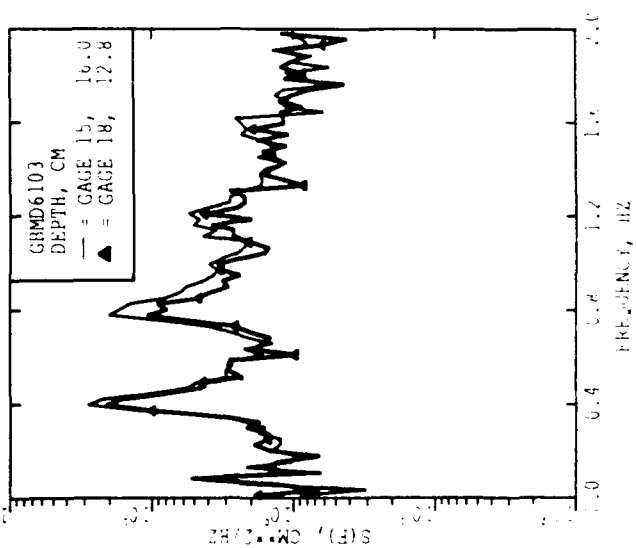
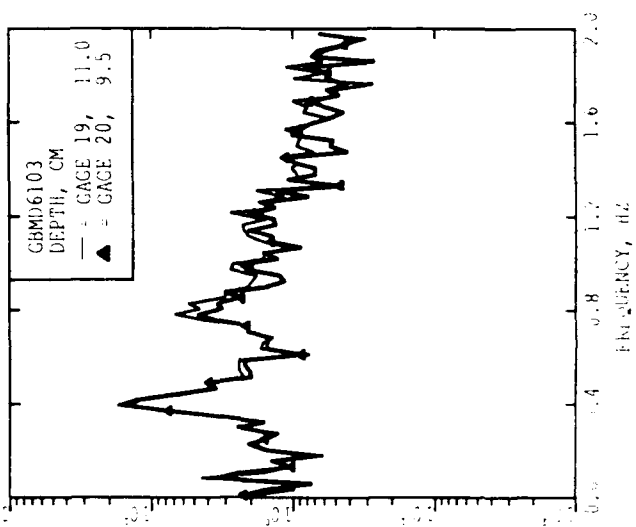
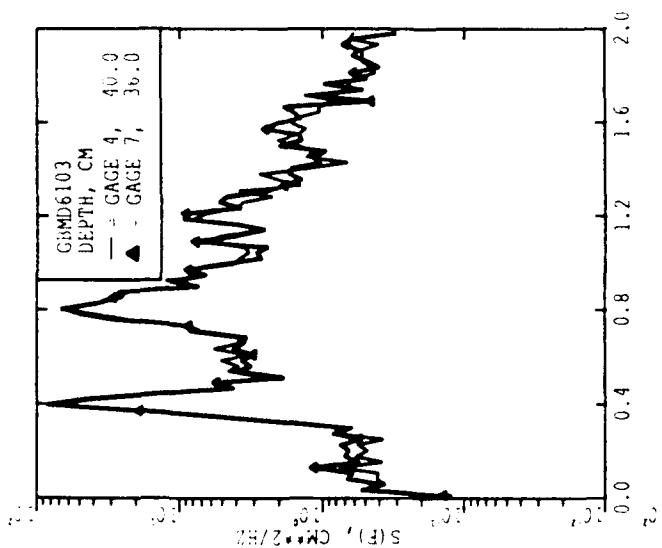
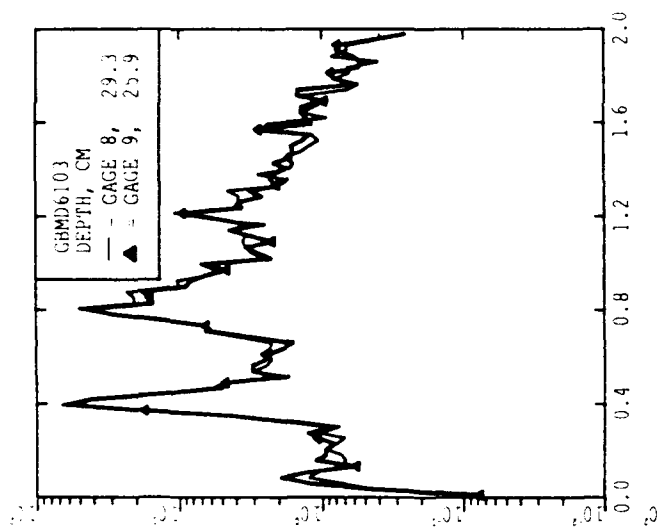
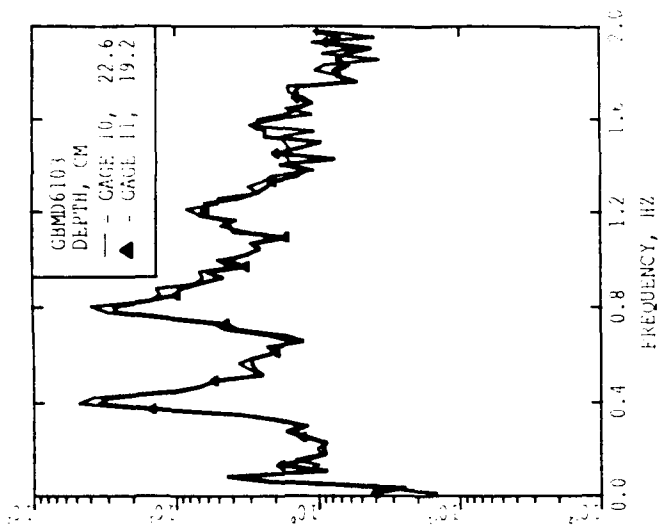


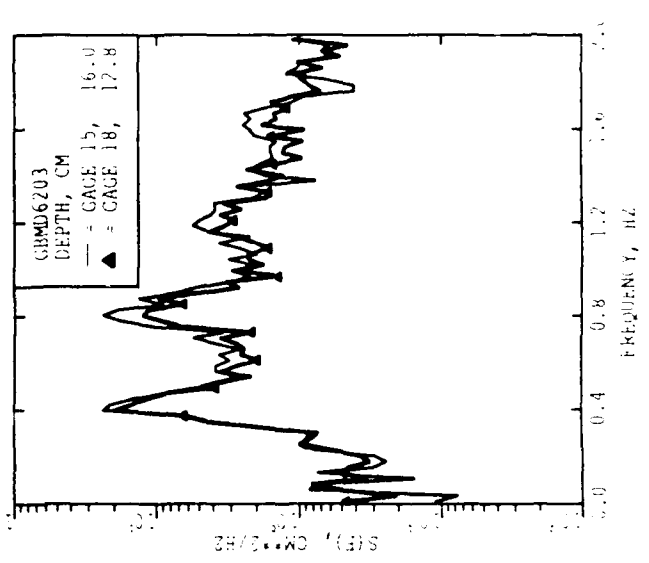
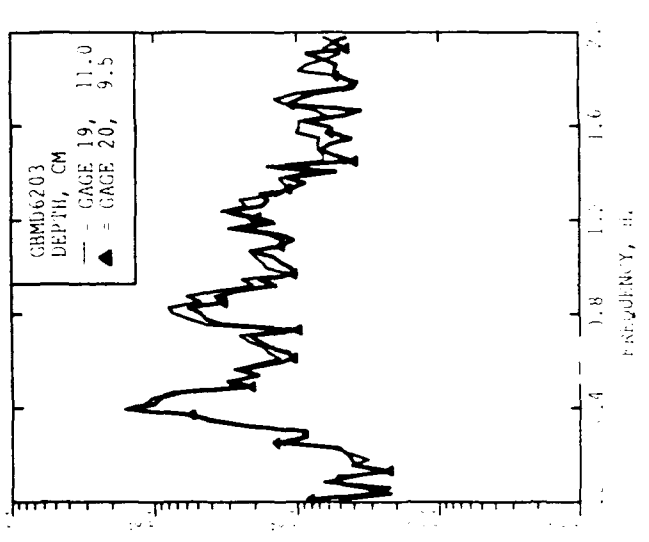
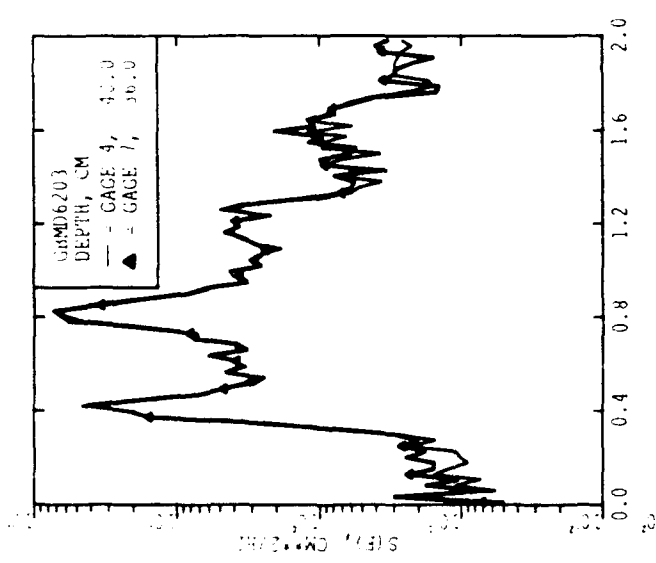
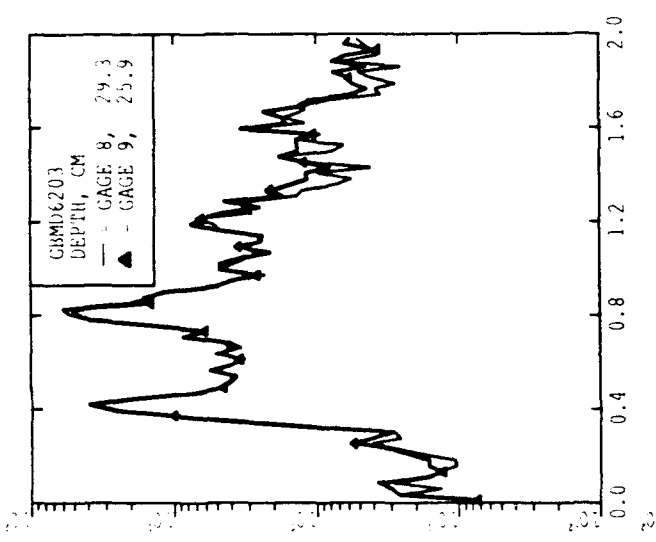
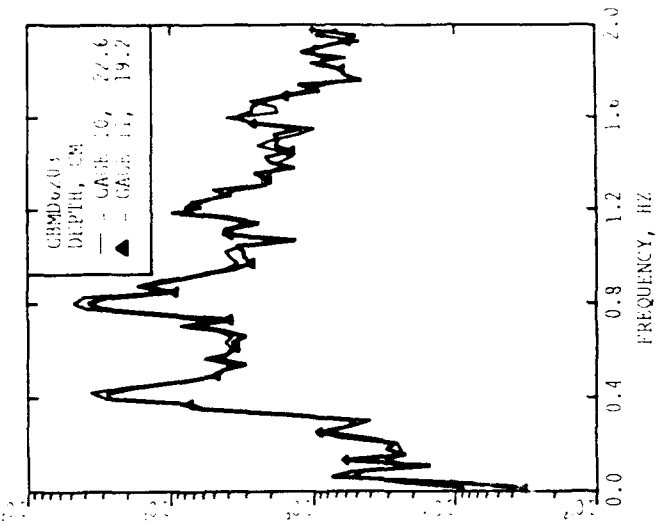


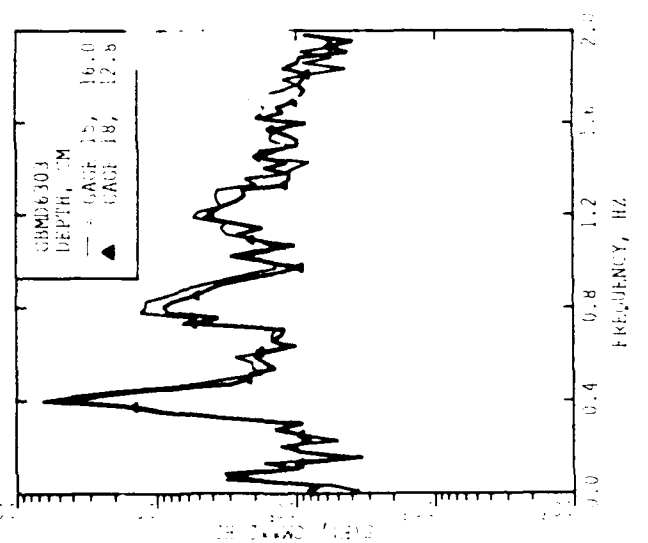
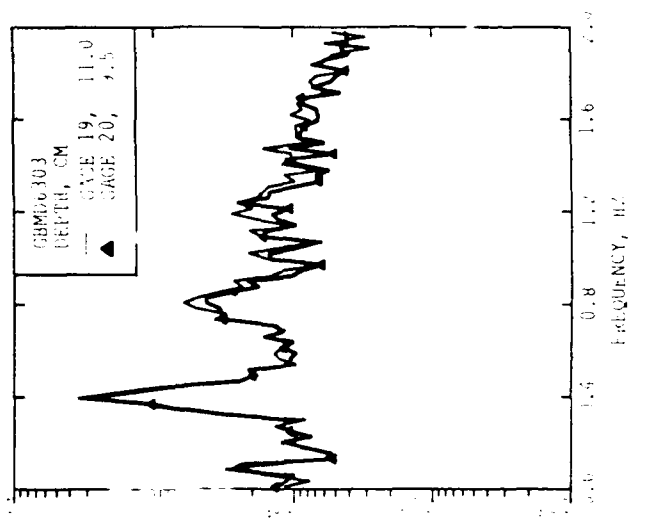
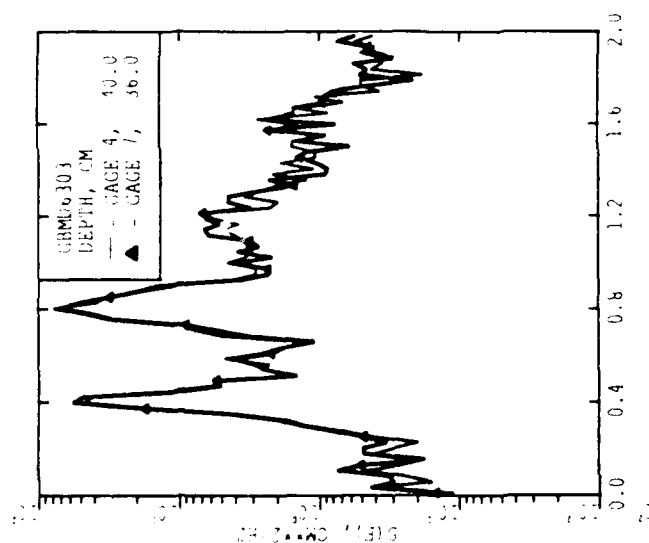
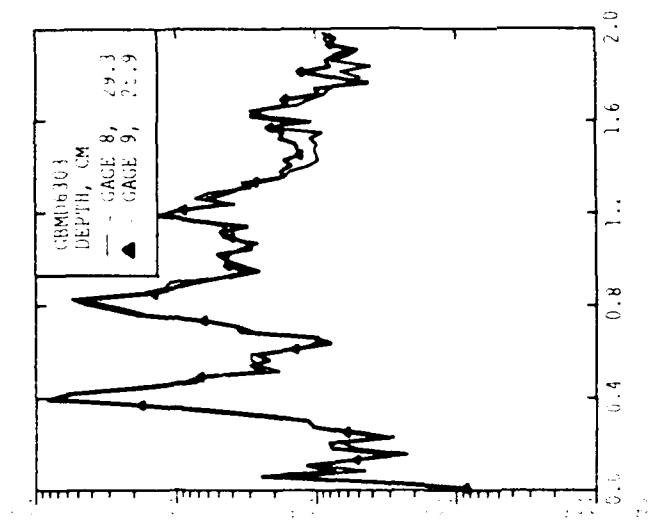
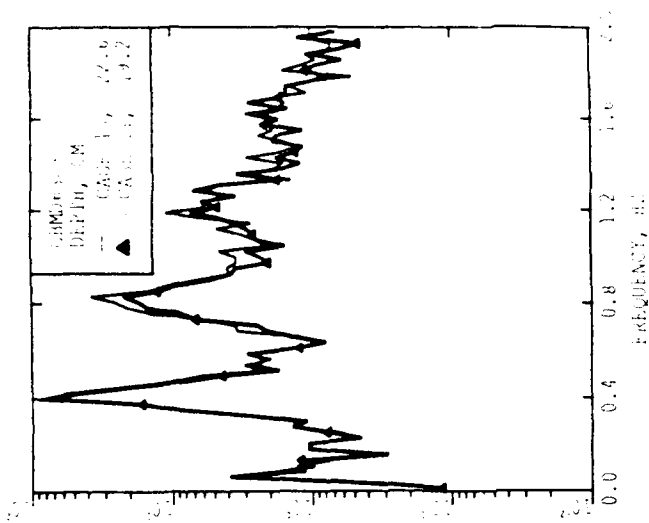


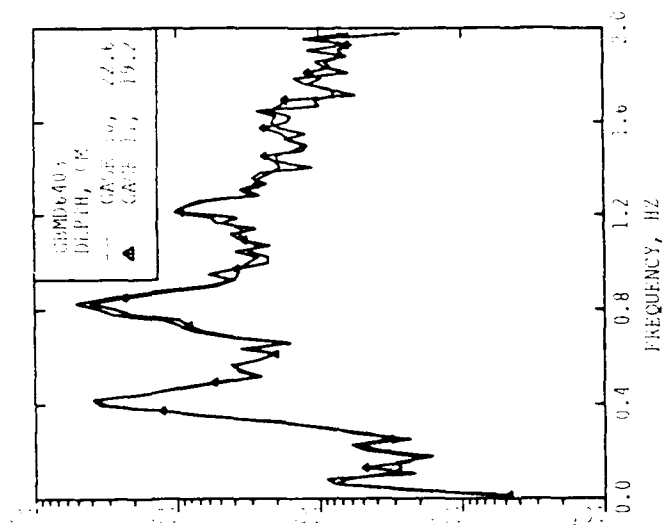
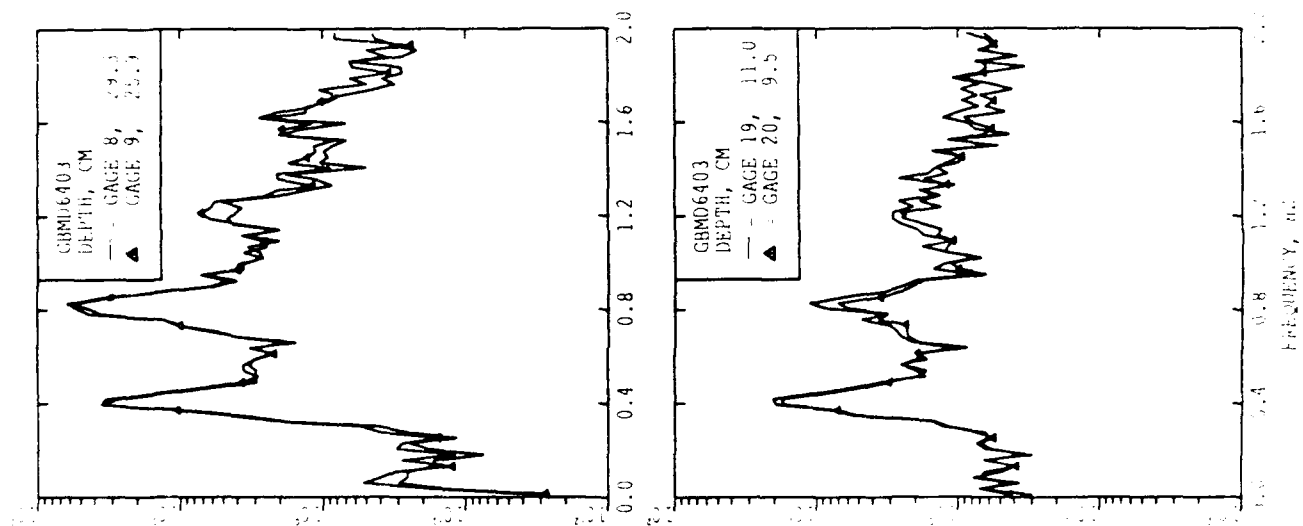
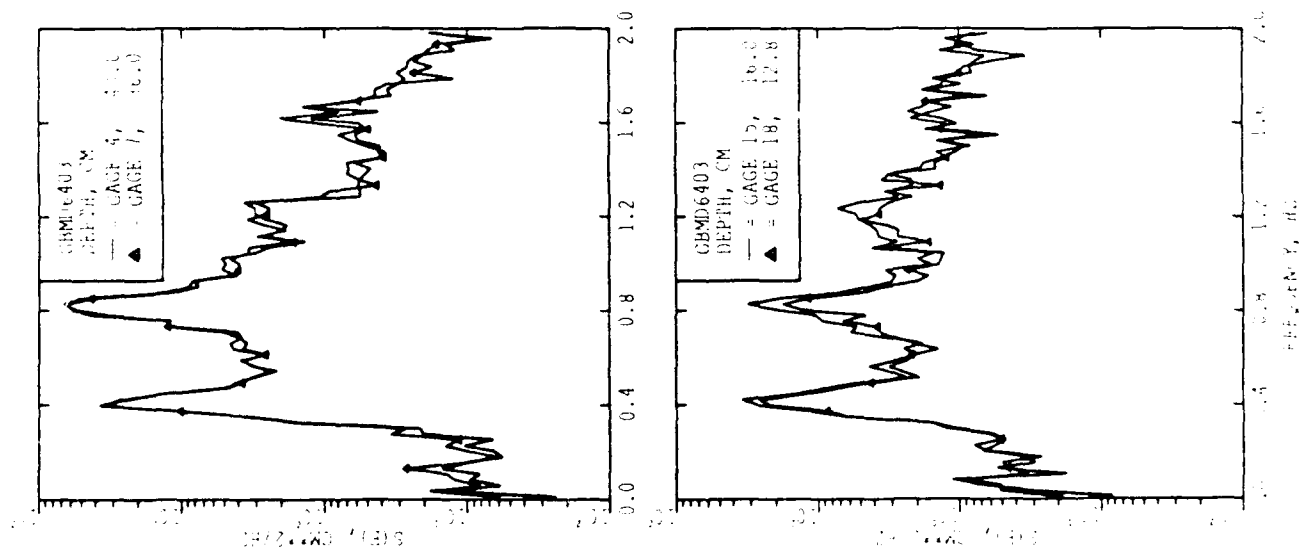


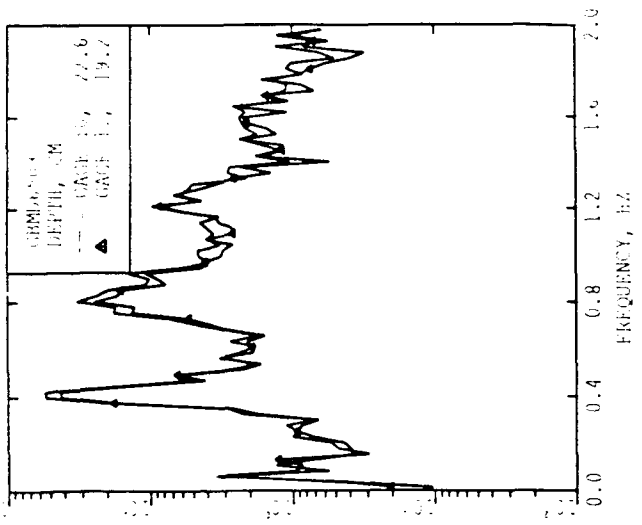
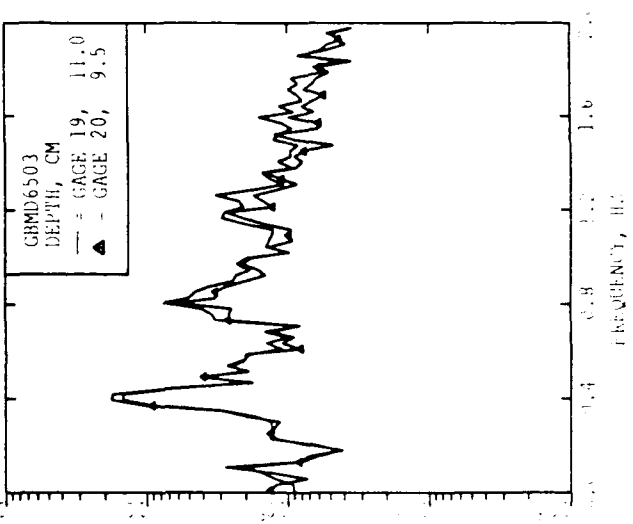
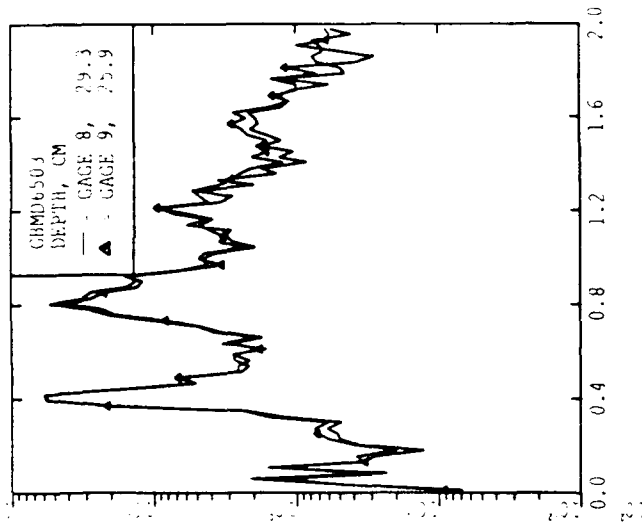
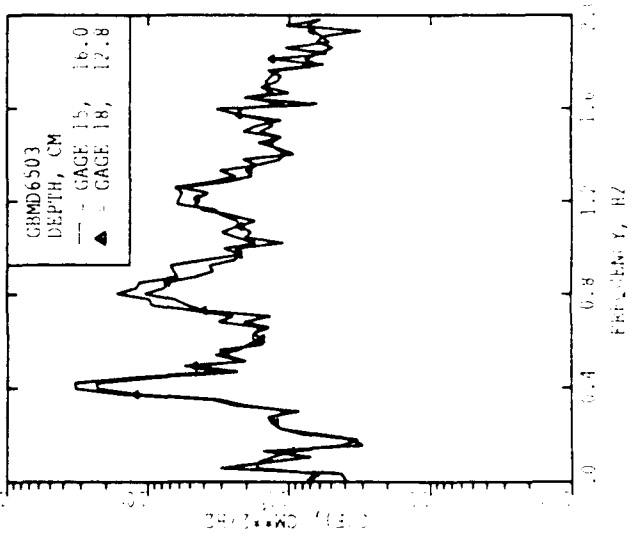
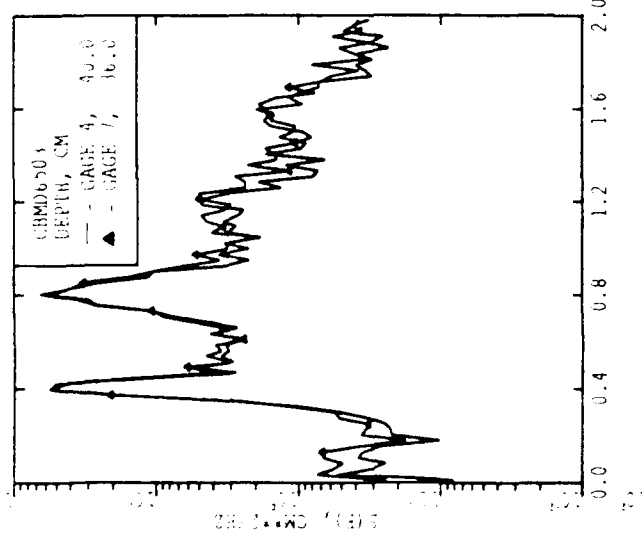


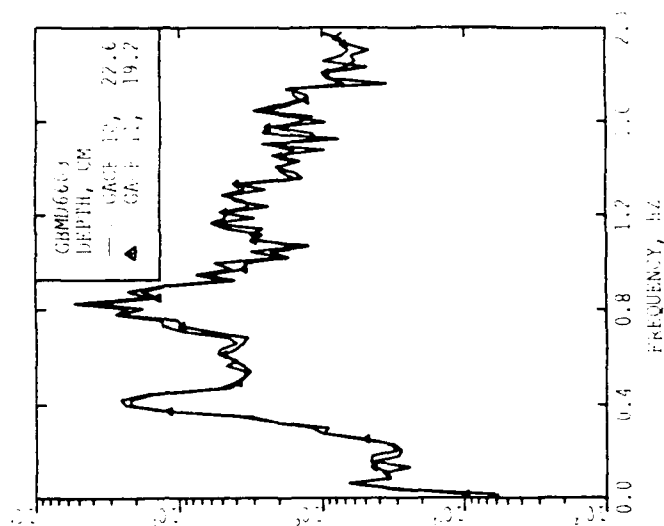
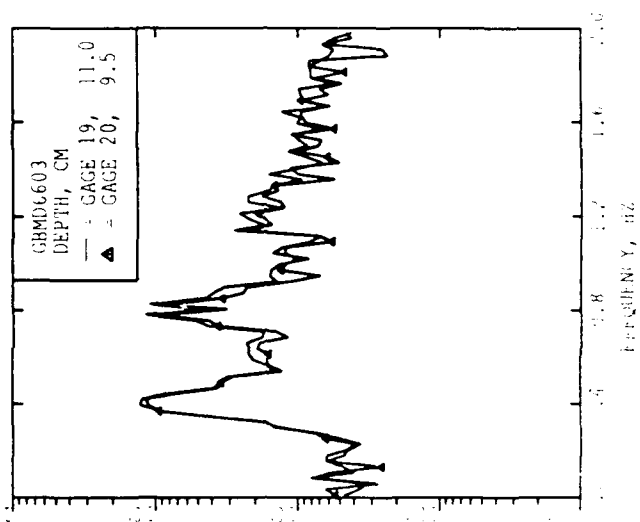
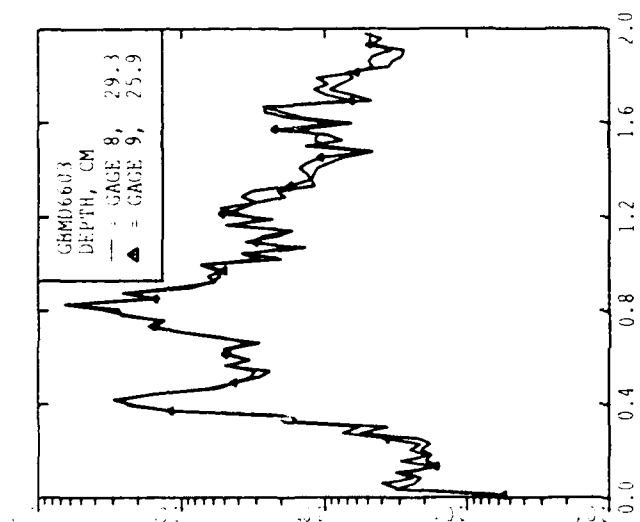
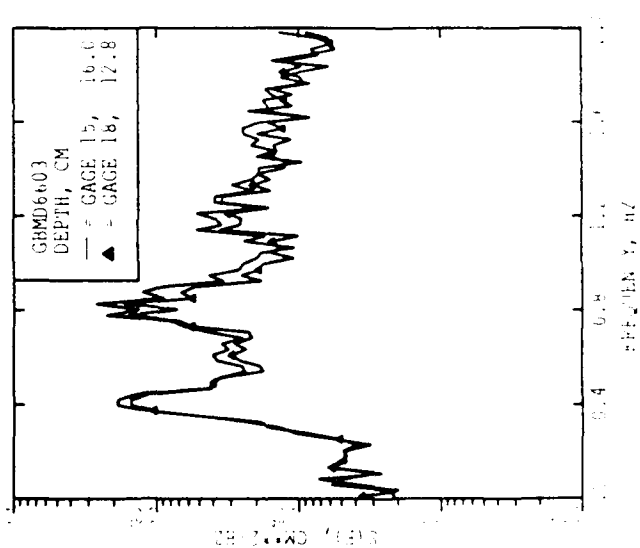
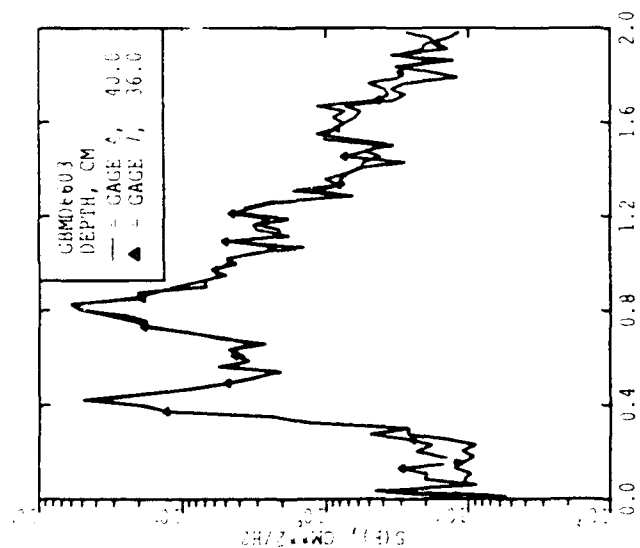




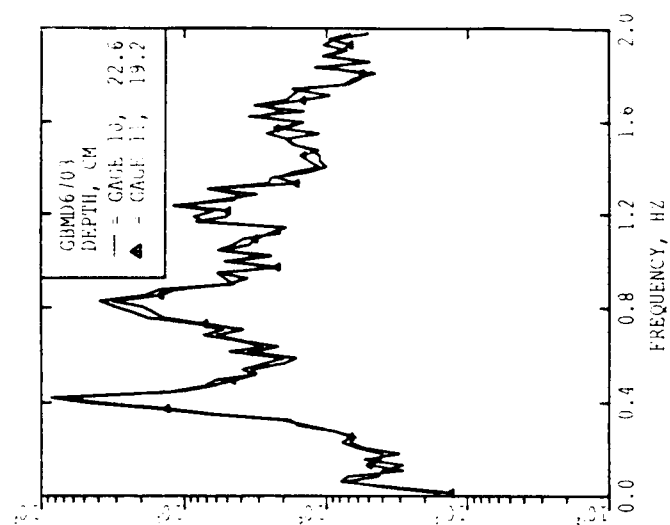
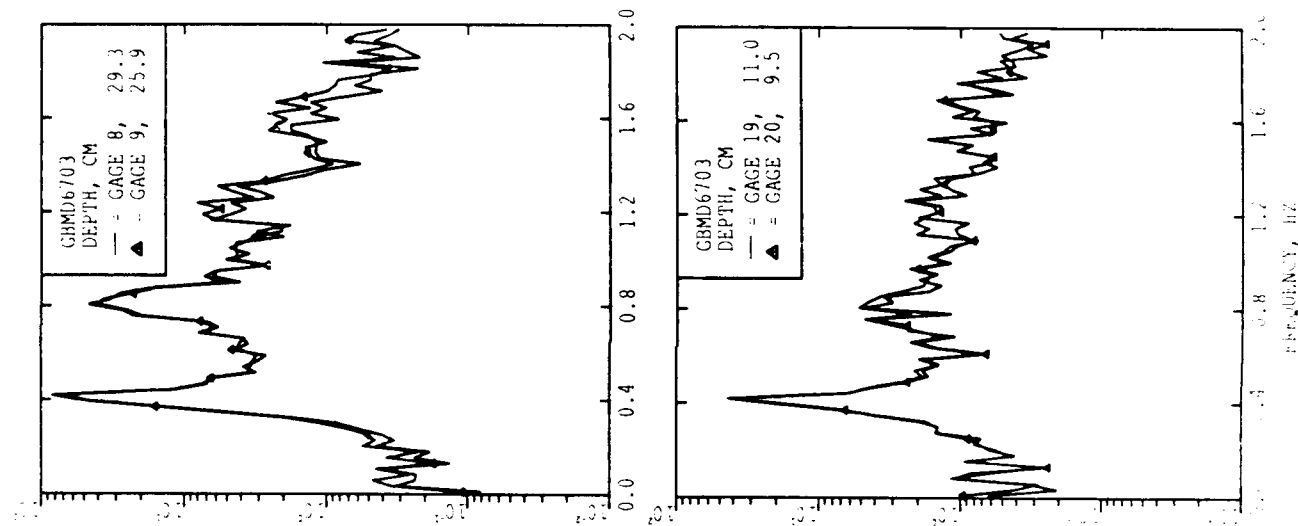
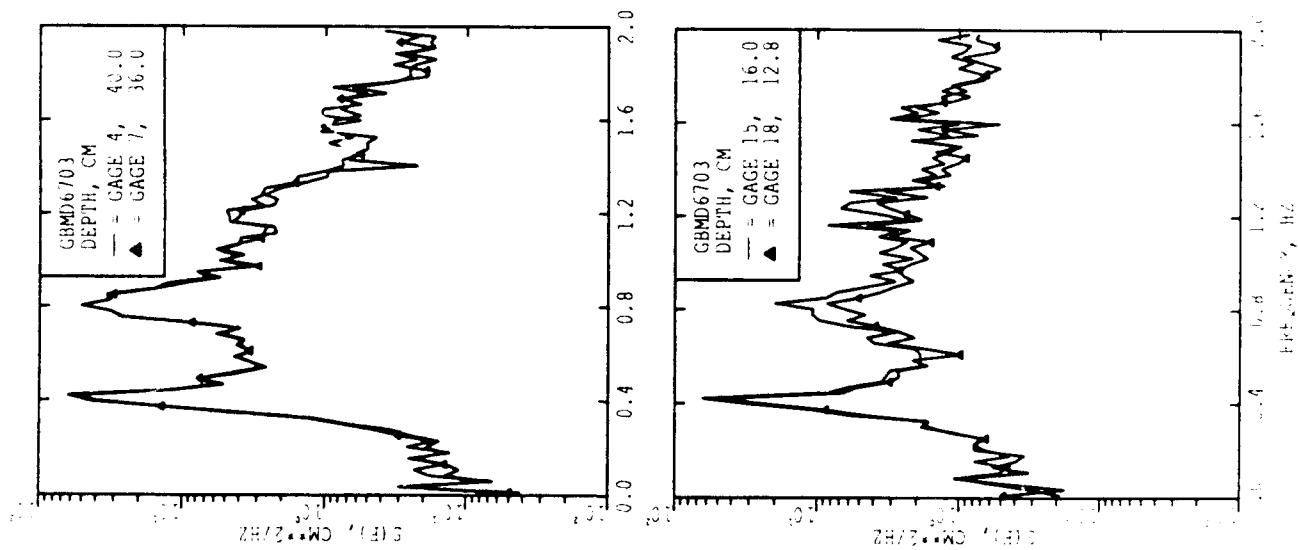


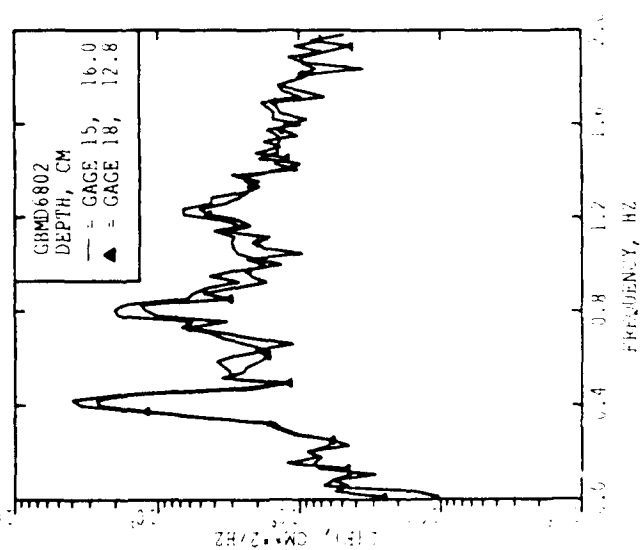
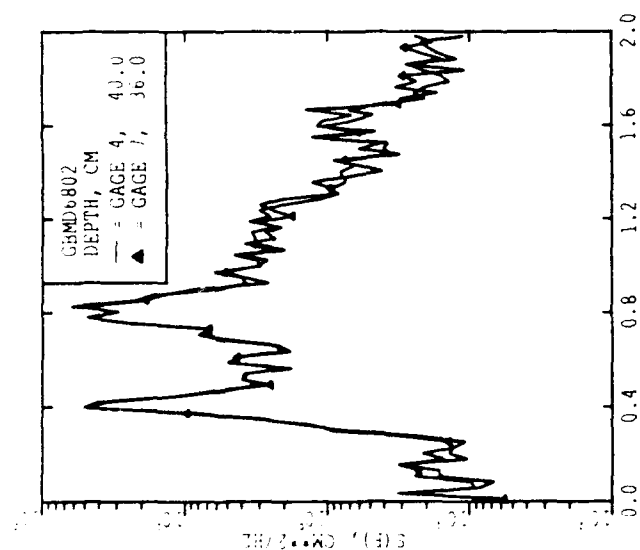
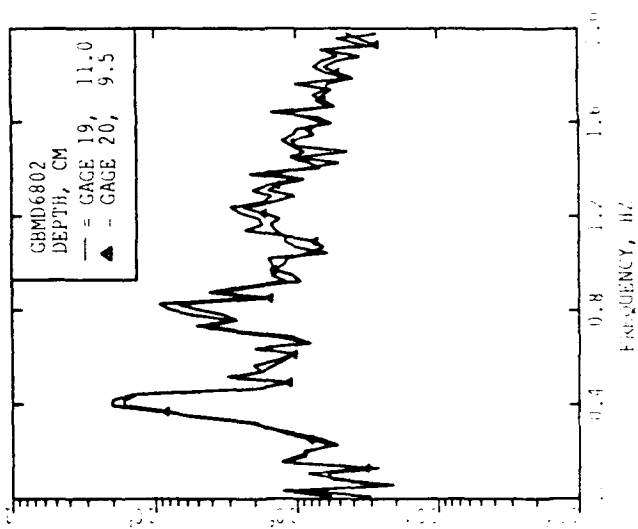
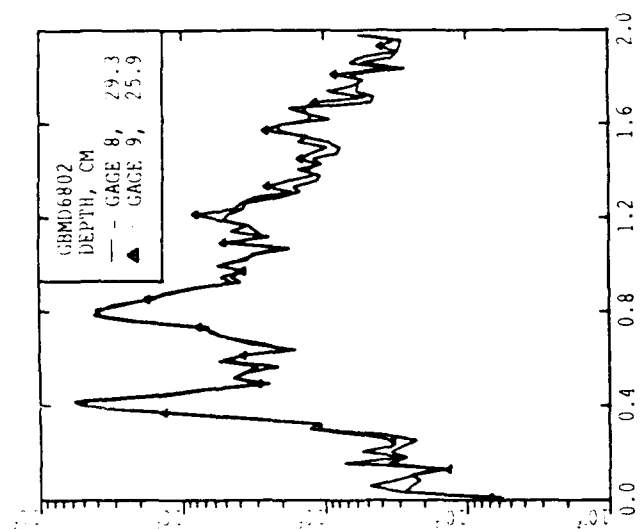
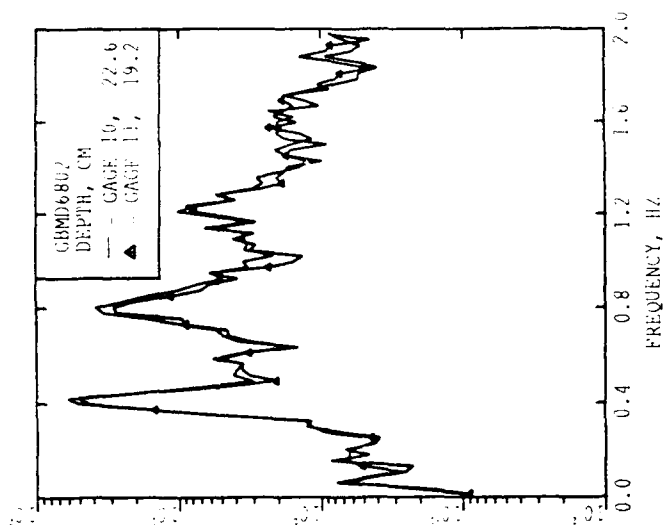


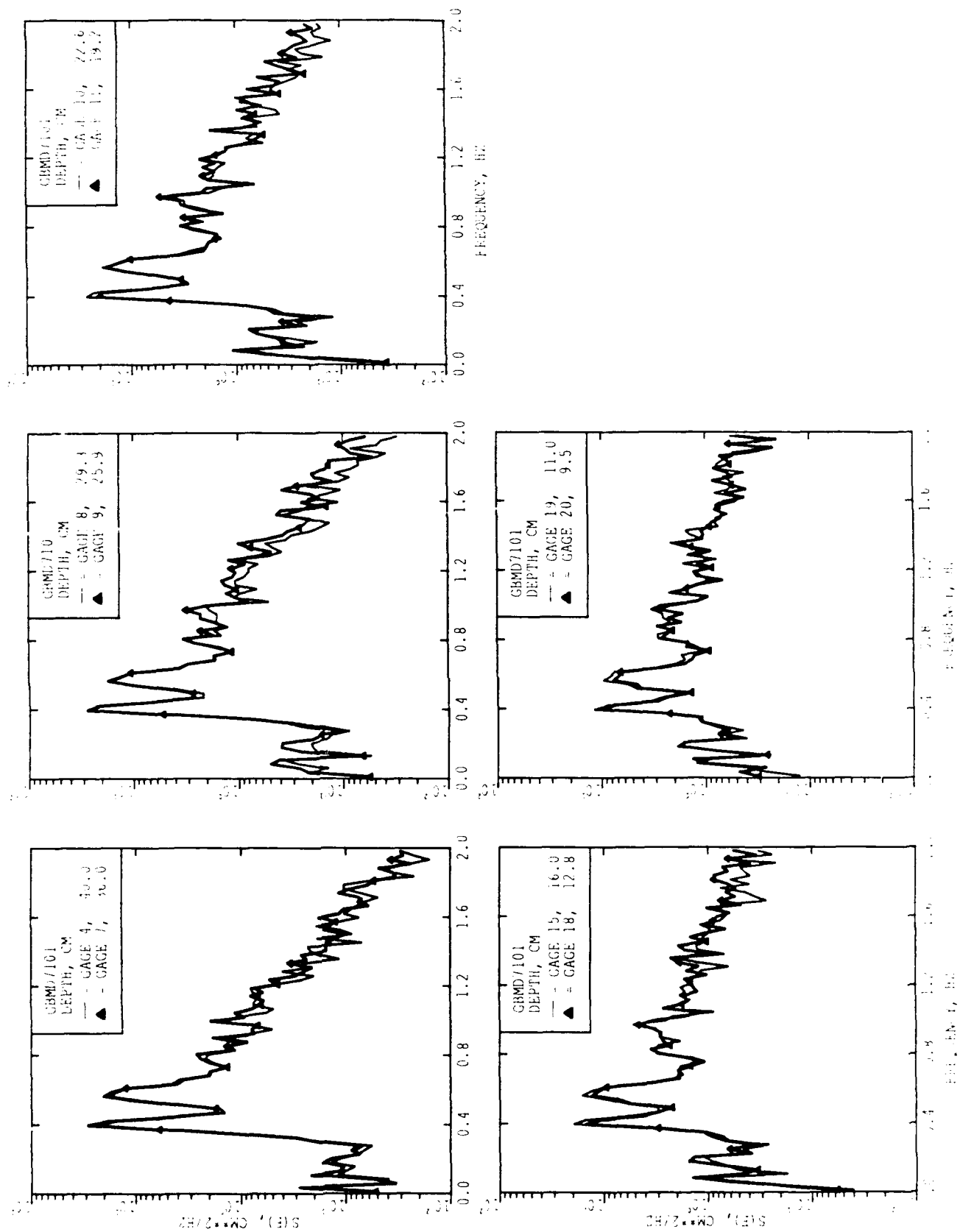


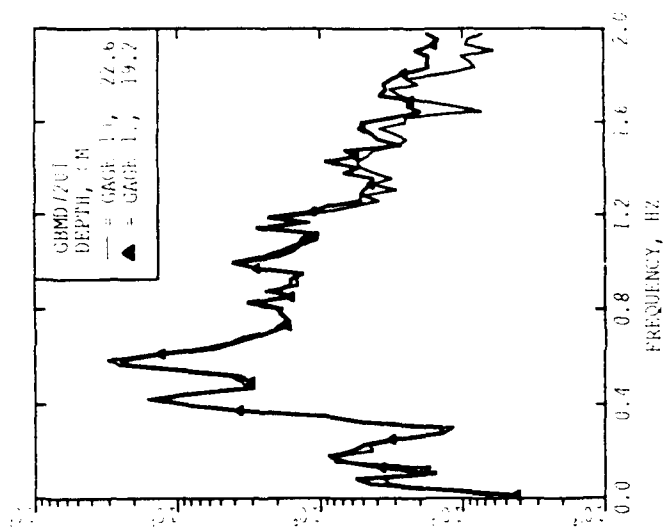
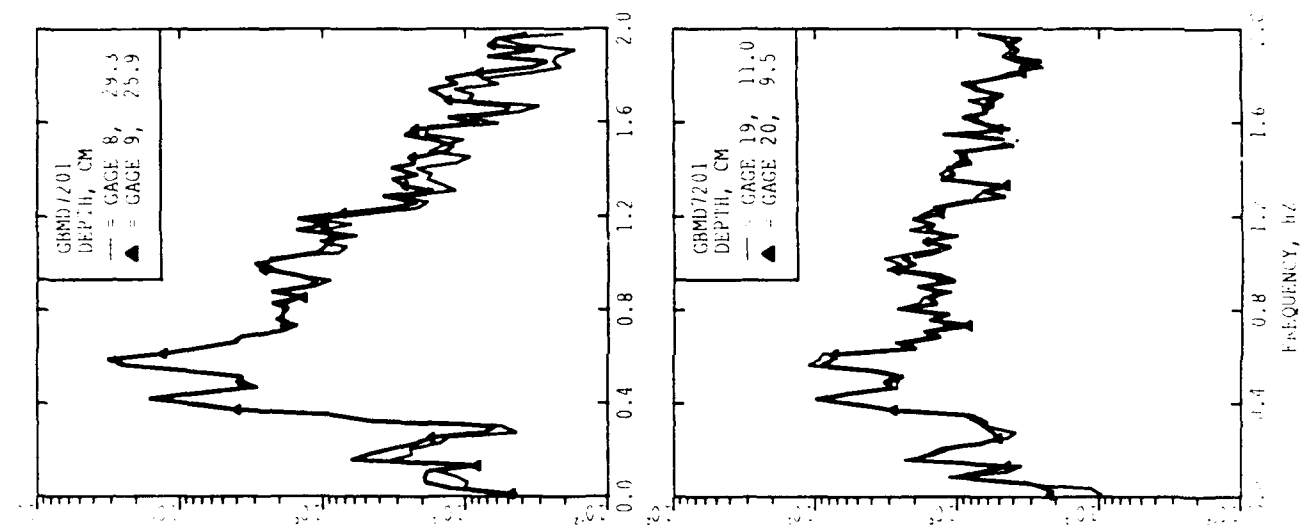
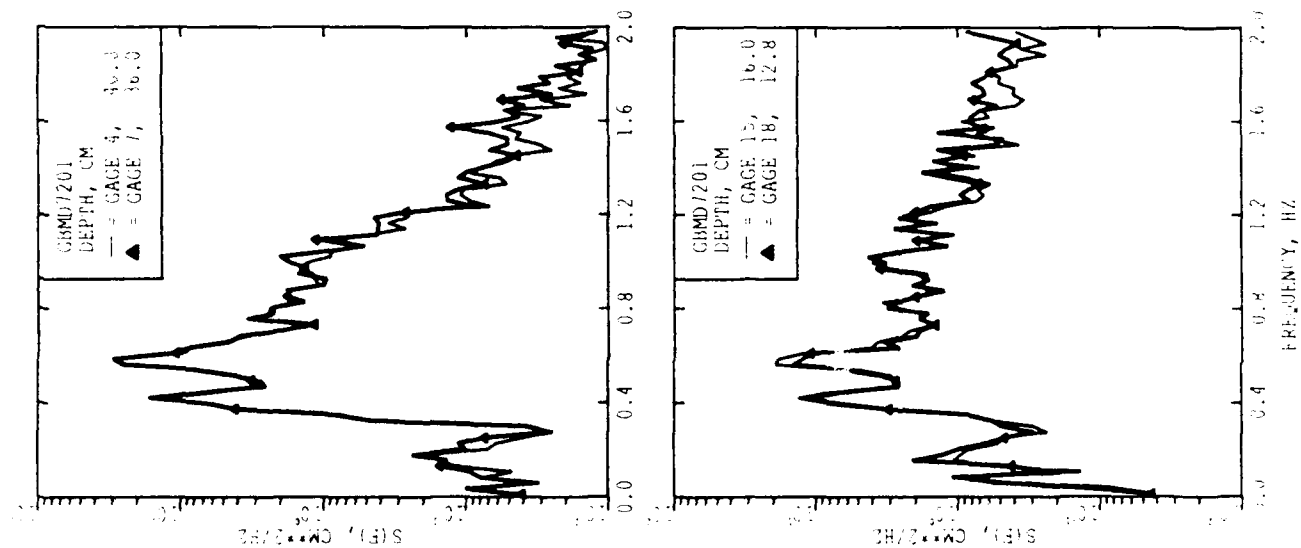


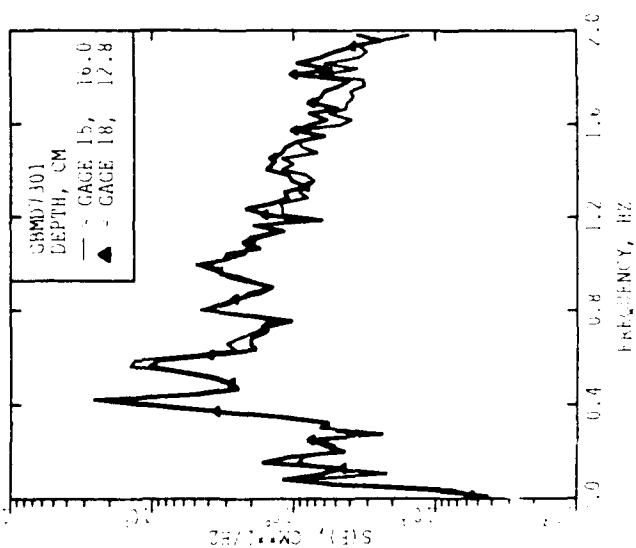
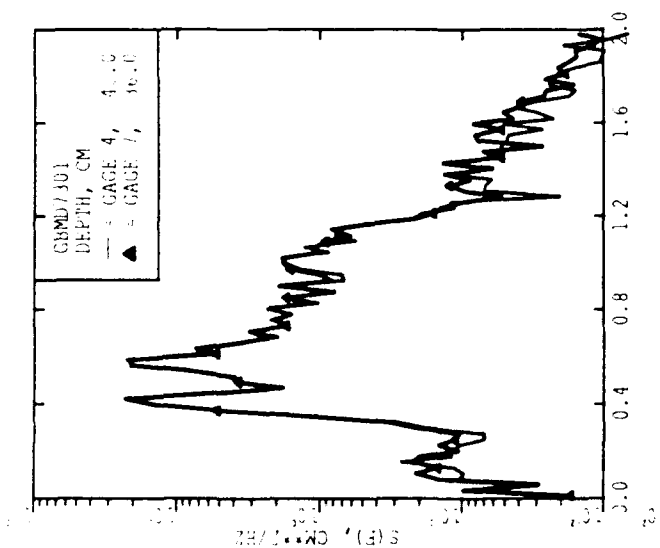
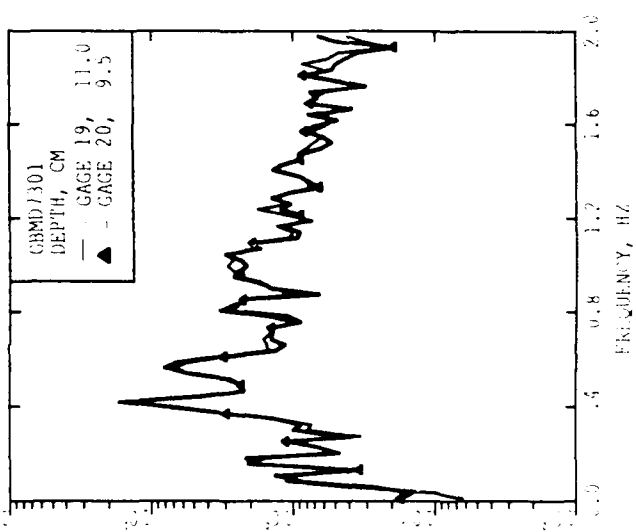
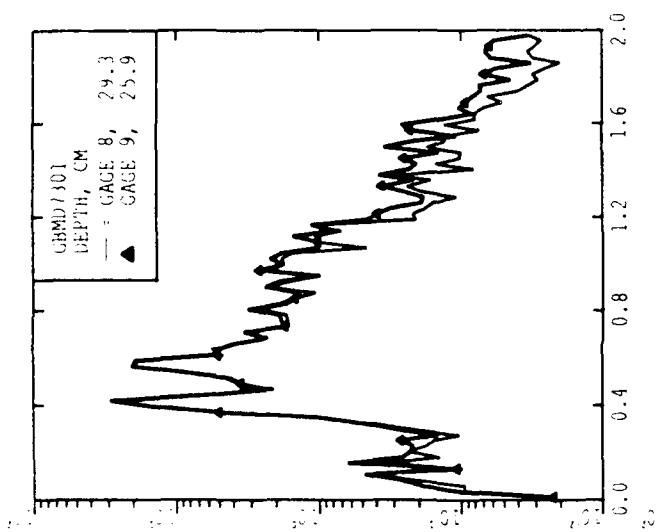
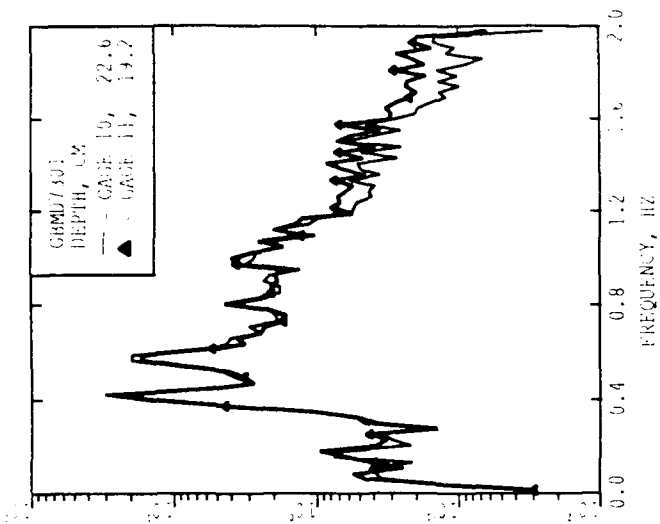


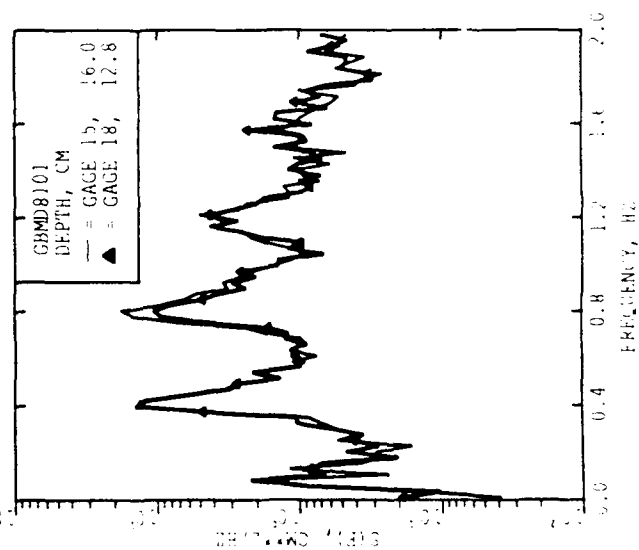
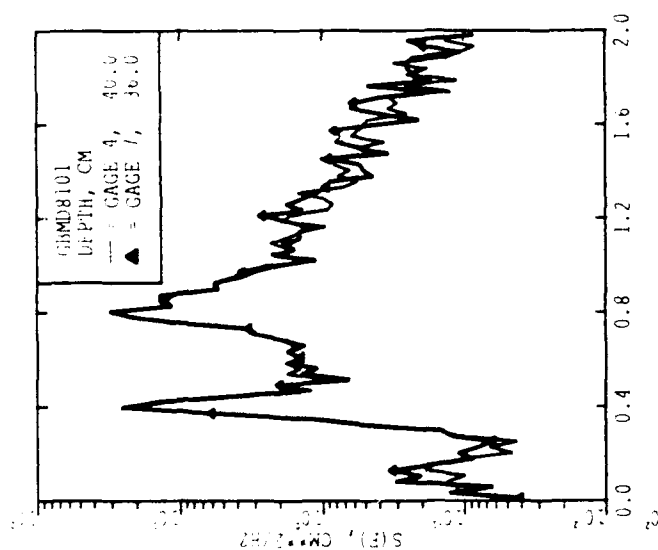
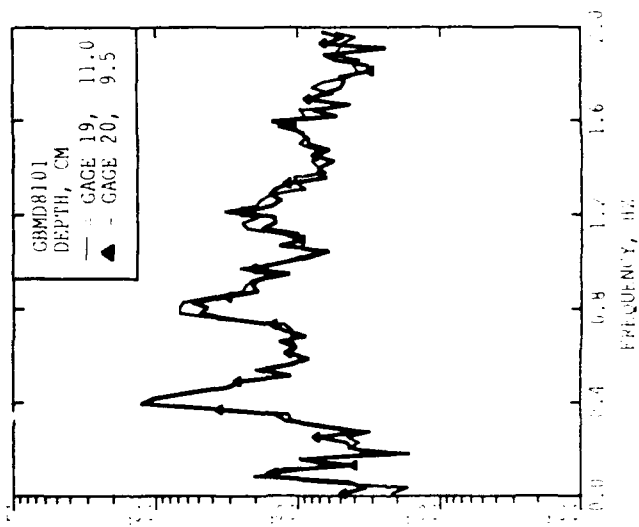
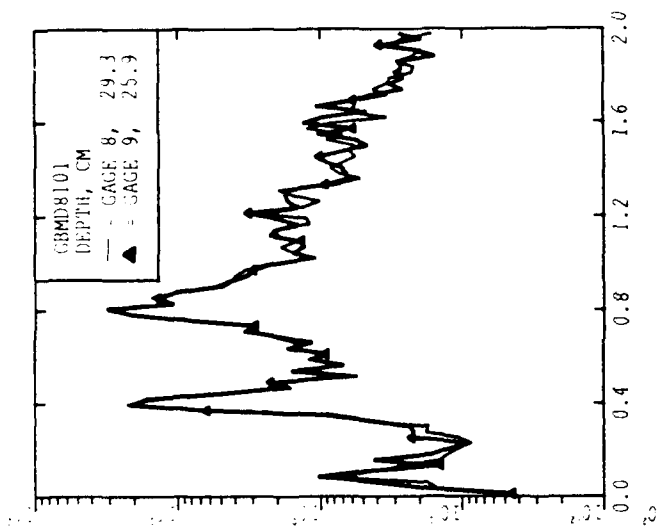
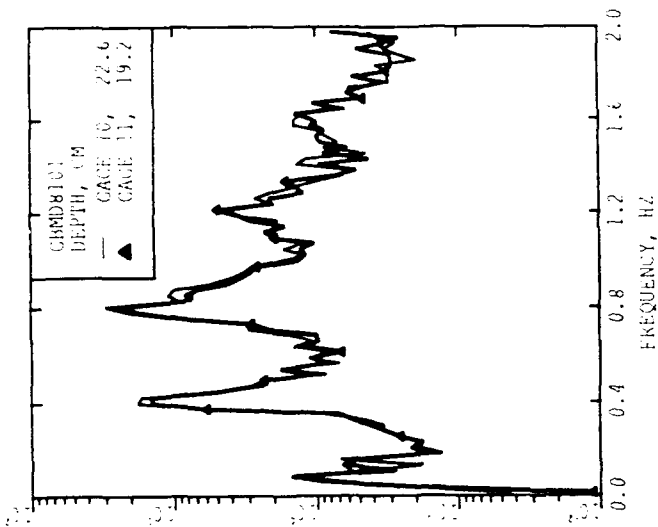


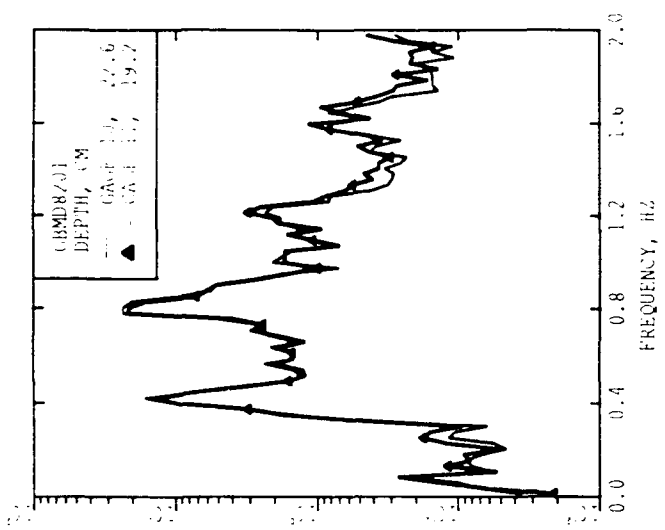
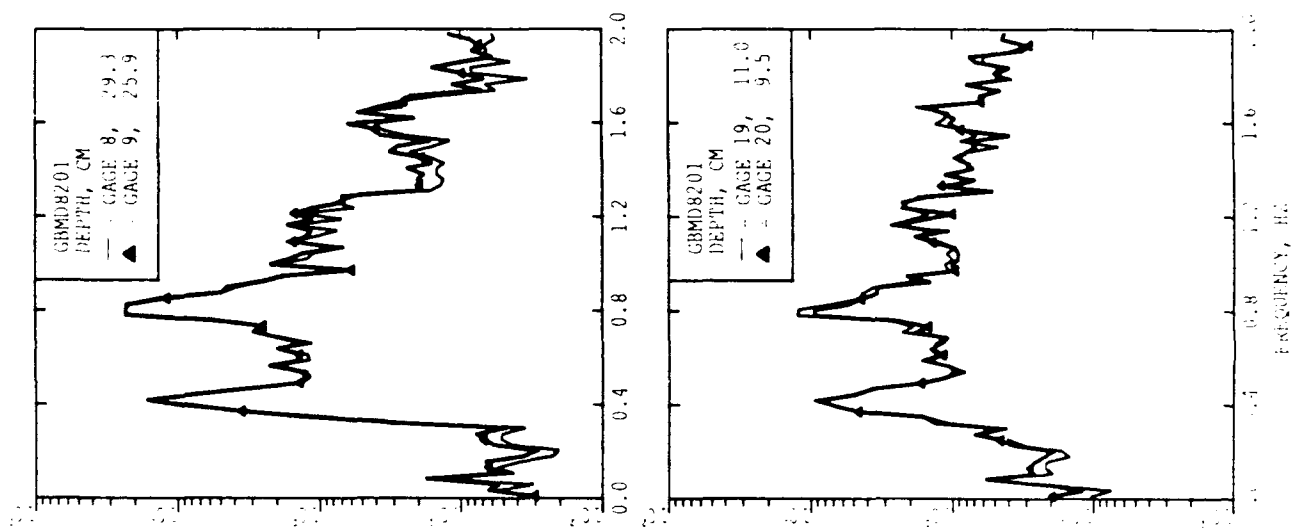
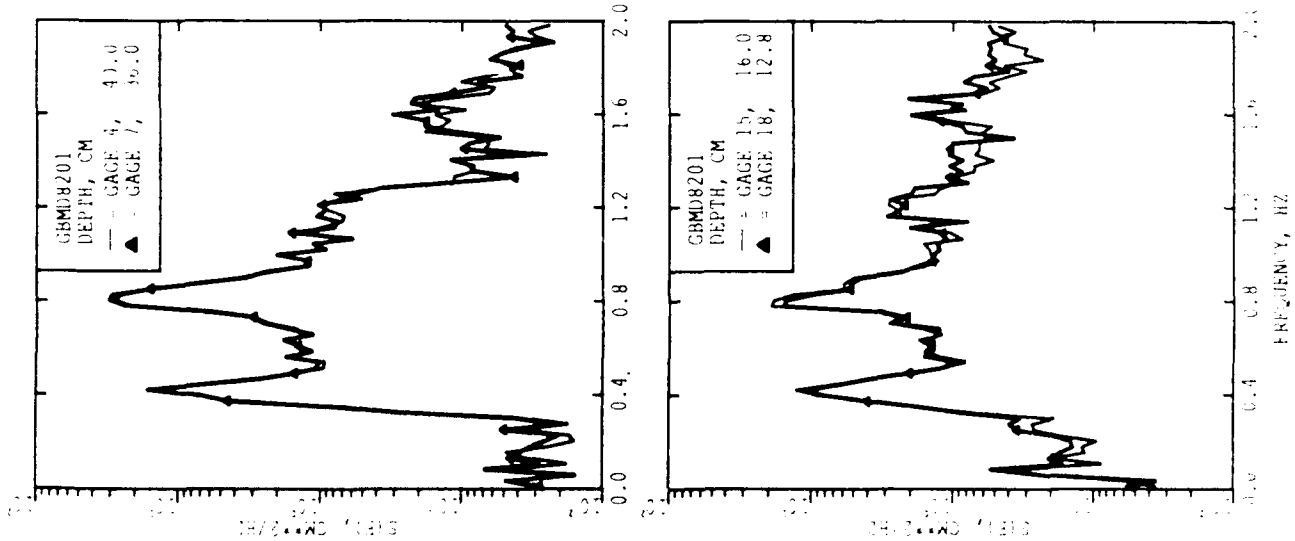


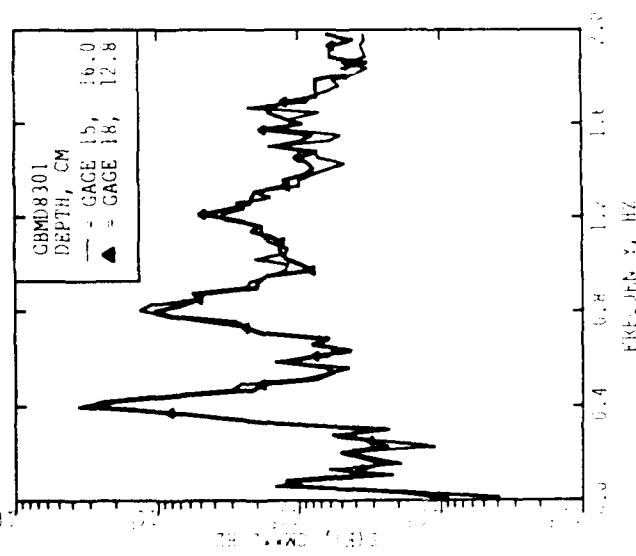
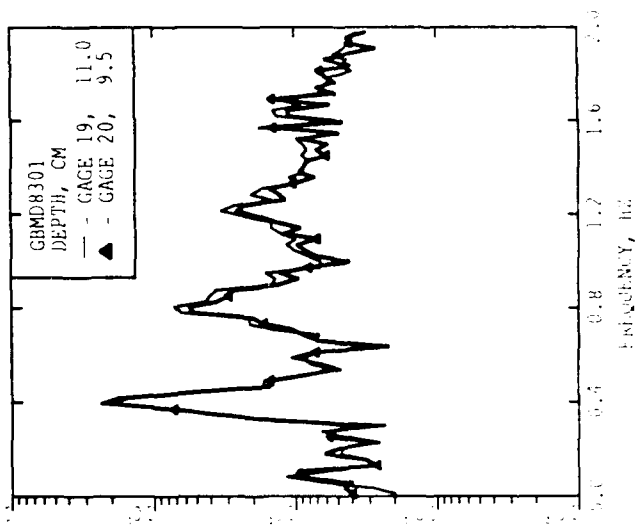
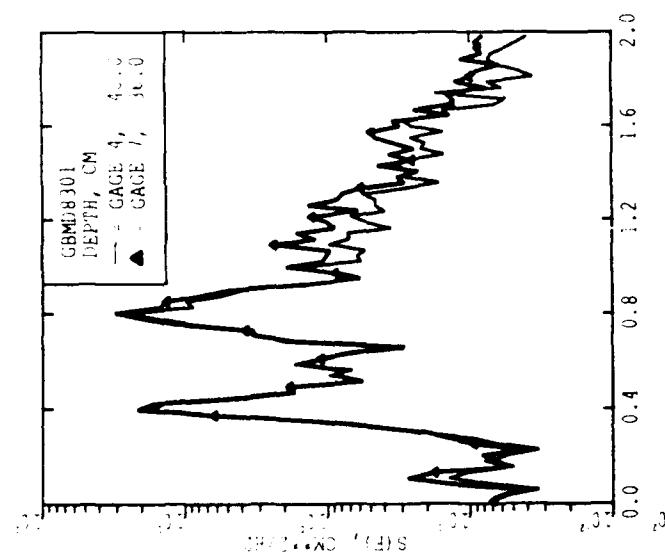
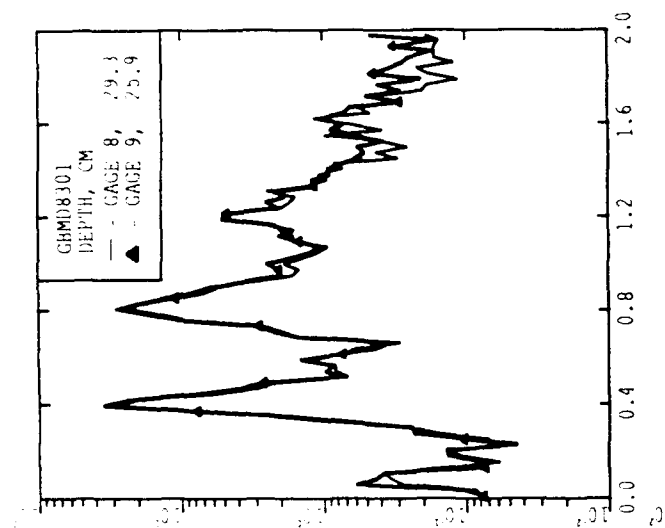
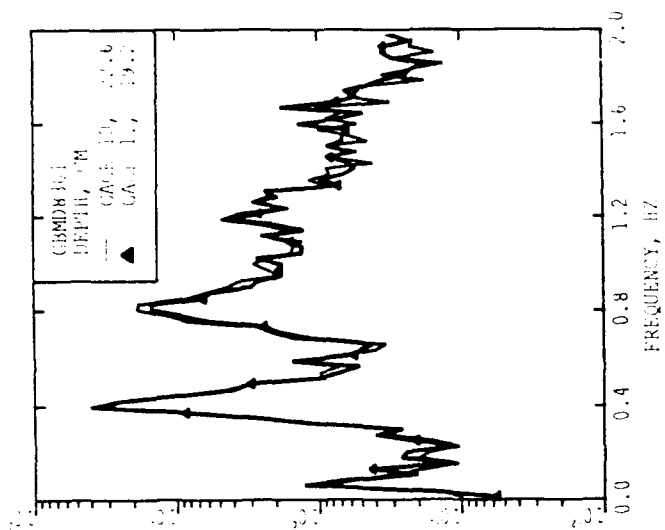




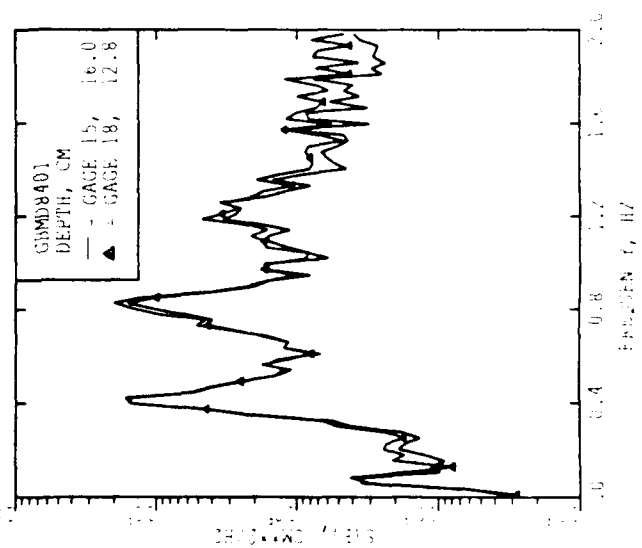
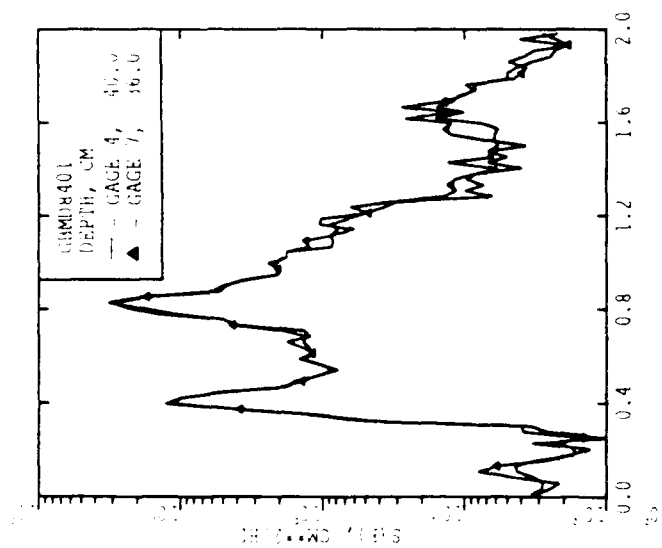
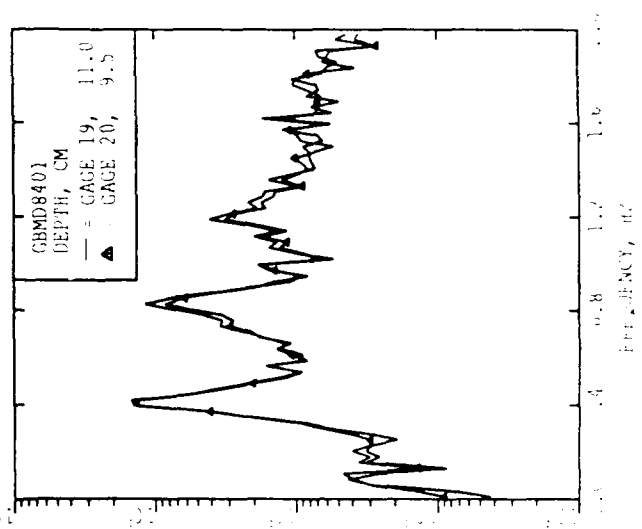
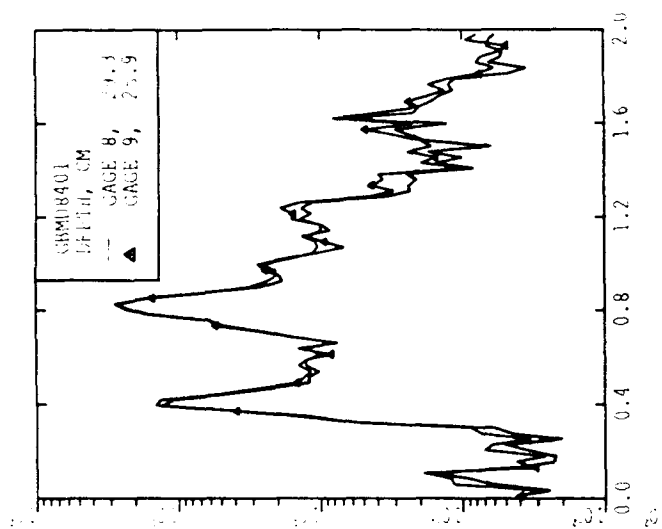
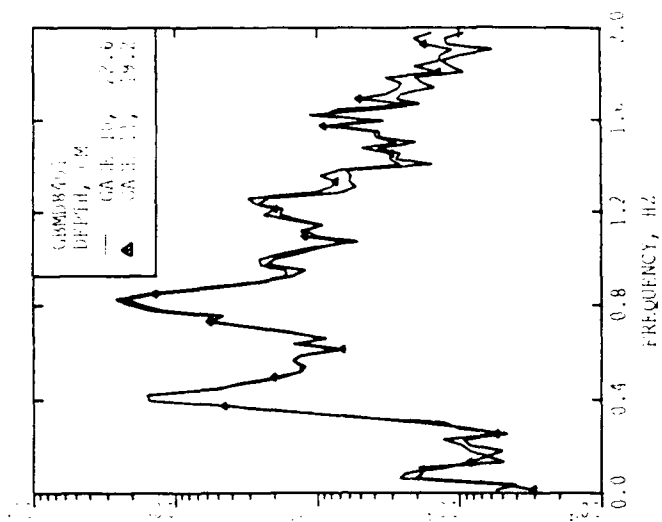


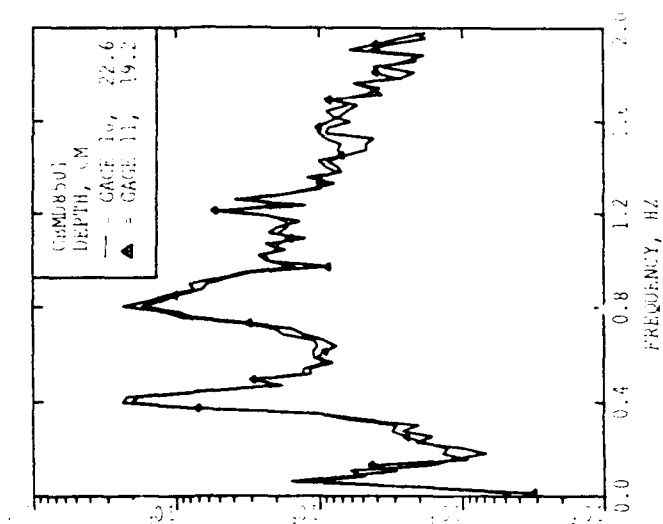
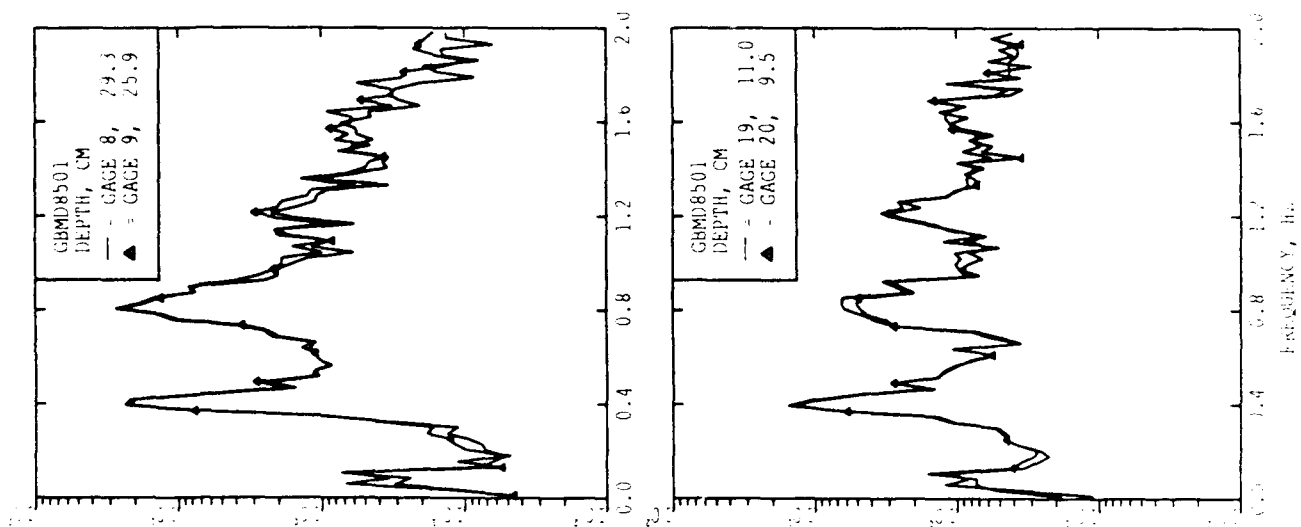
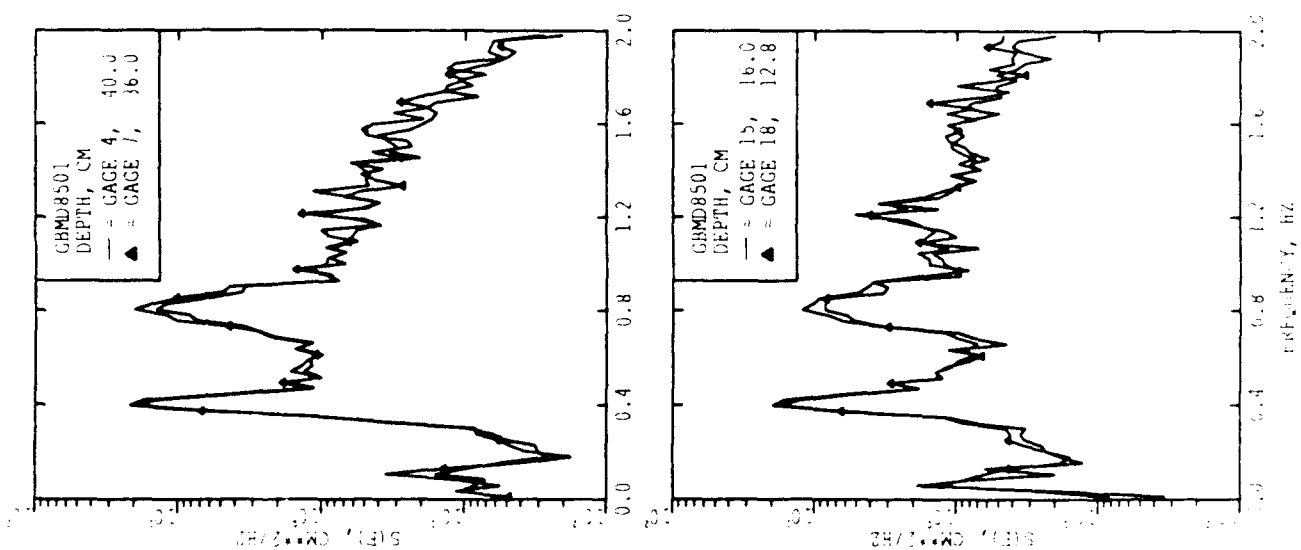


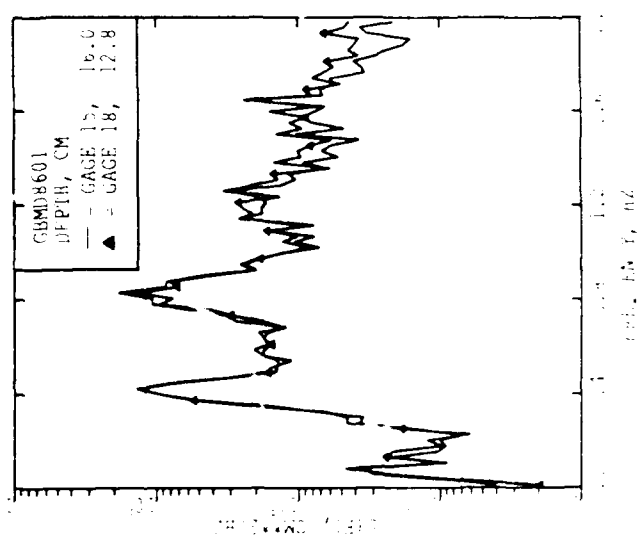
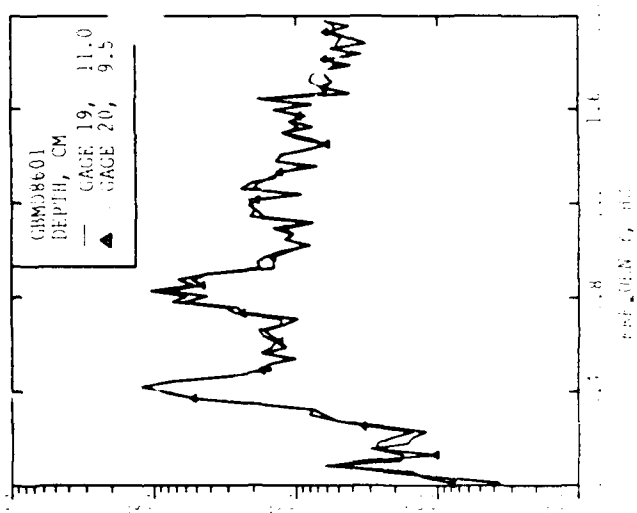
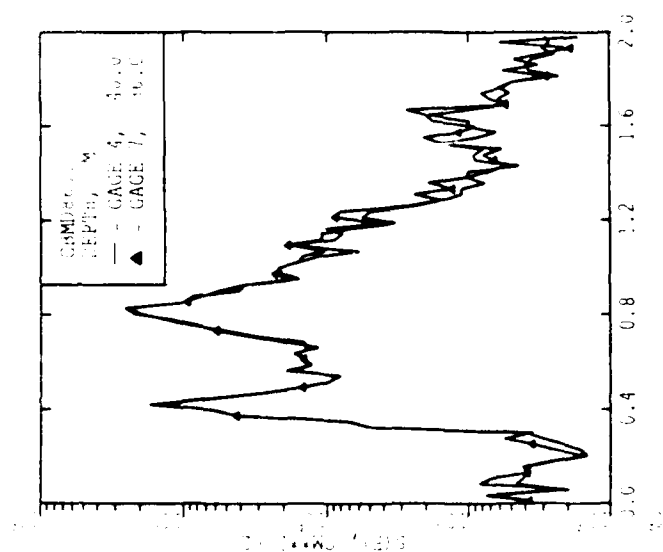
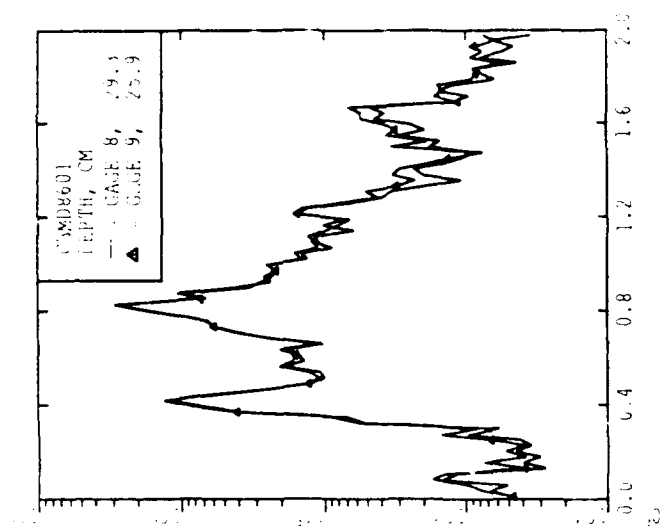
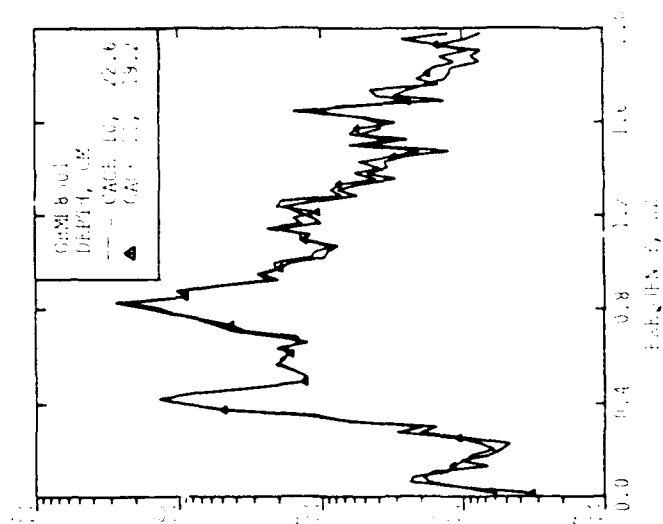


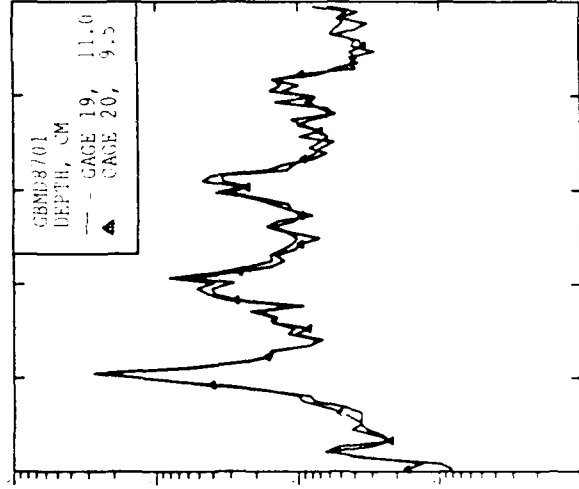
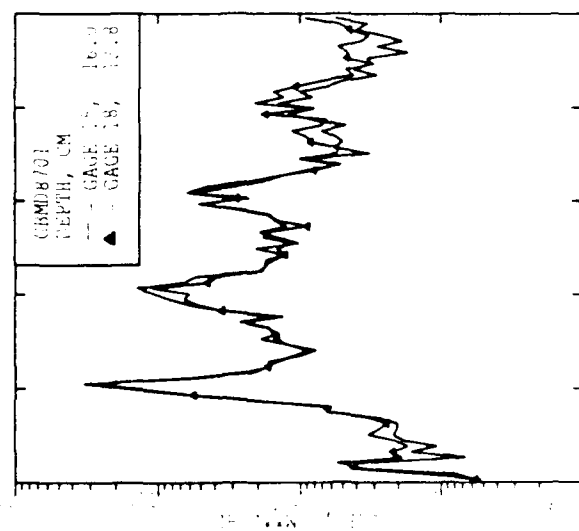
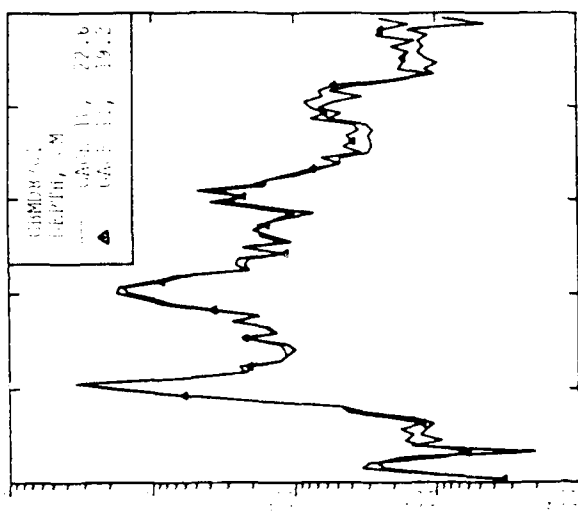
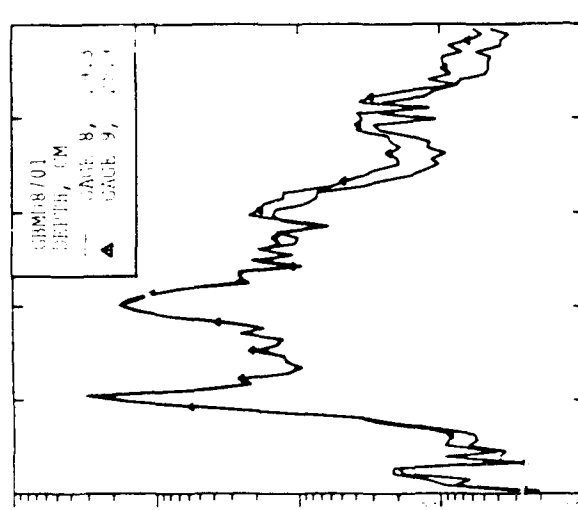
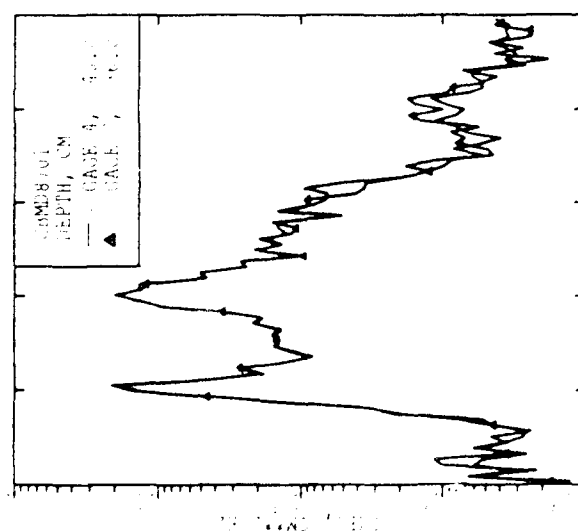




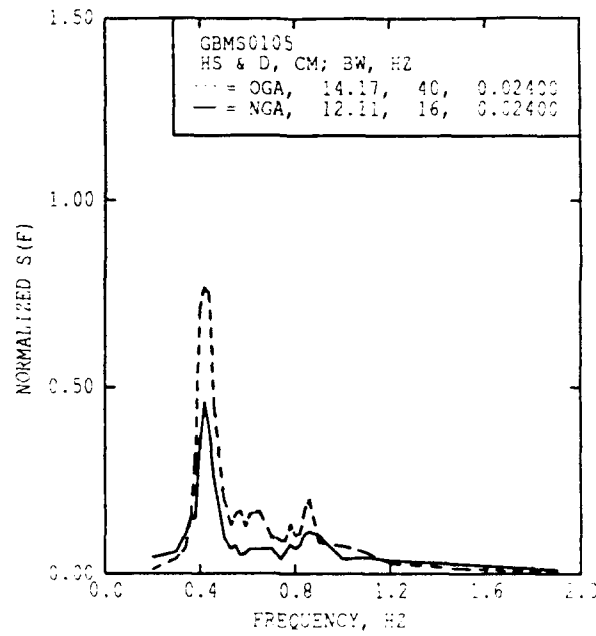




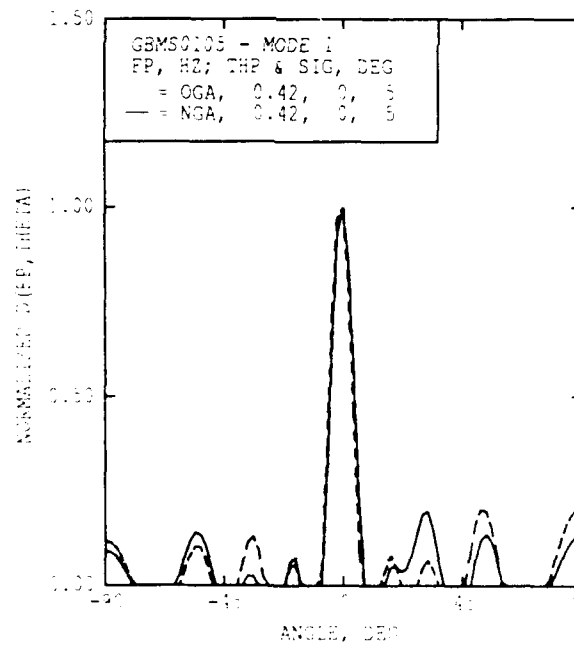




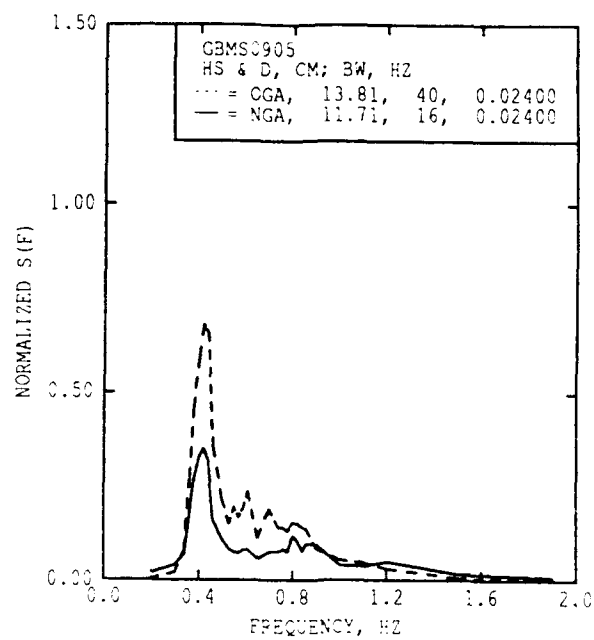
APPENDIX I: MEASURED OFFSHORE AND NEARSHORE ARRAY DIRECTIONAL SPECTRA



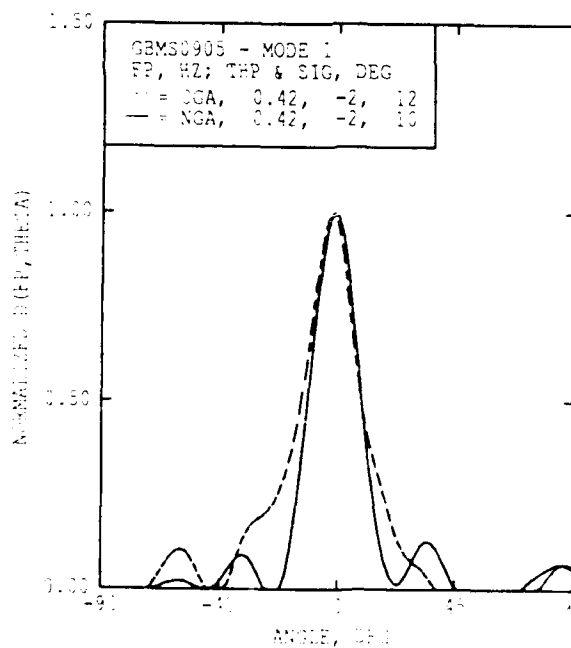
A) OGA VS. NGA FREQUENCY SPECTRA  
 CASE CODE = B



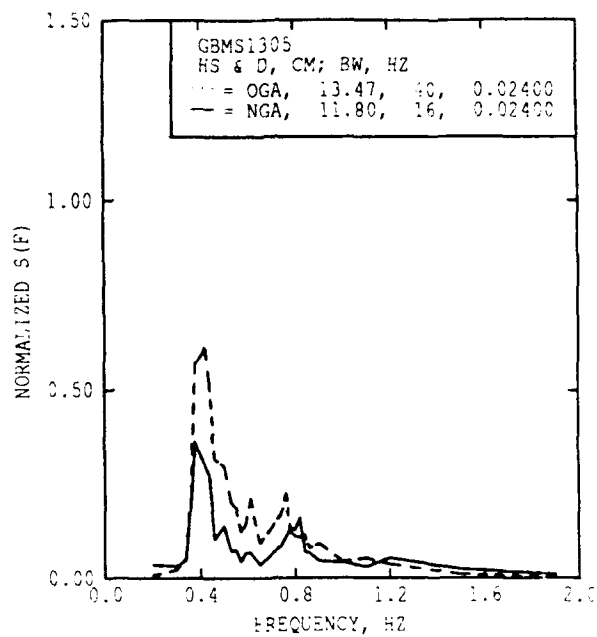
B) OGA VS. NGA STREAMLINE PATTERN  
 CASE CODE = B



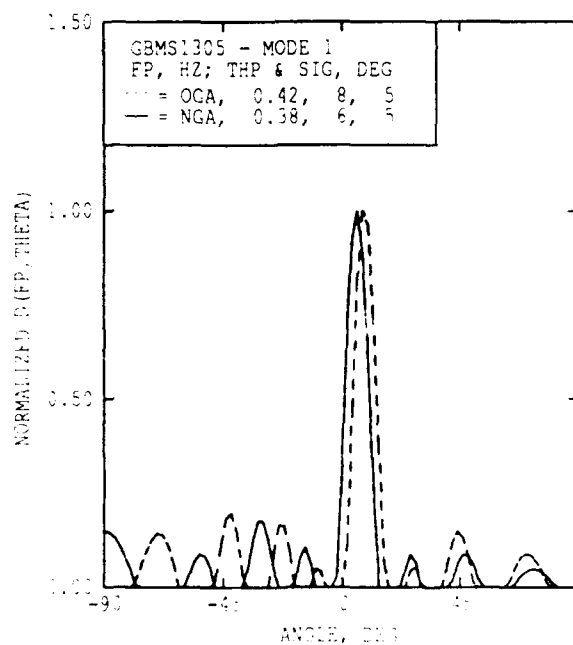
A) OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE = A



B) OGA VS. NGA SPREADING & PEAK SIG.  
GAGE CODE = A

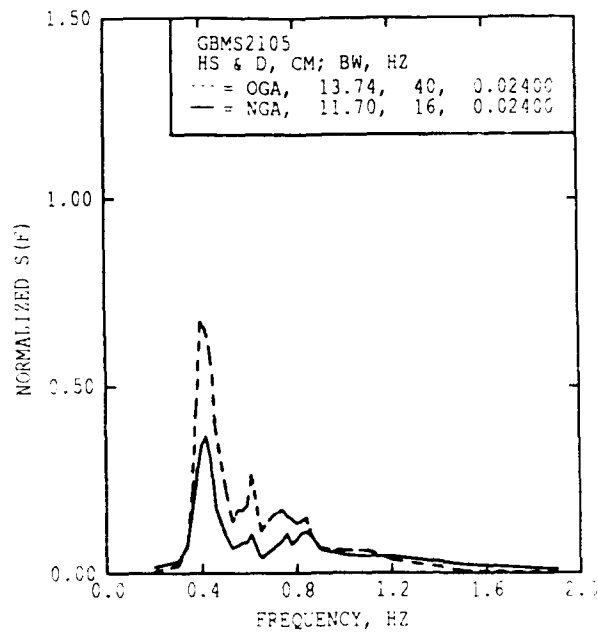


A) OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE = 3

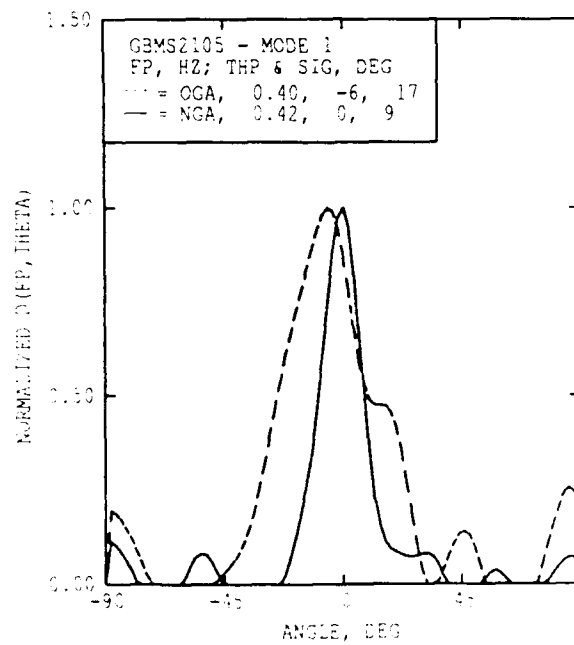


B) OGA VS. NGA BUREADING vs. ANGLE  
GAGE CODE = 3

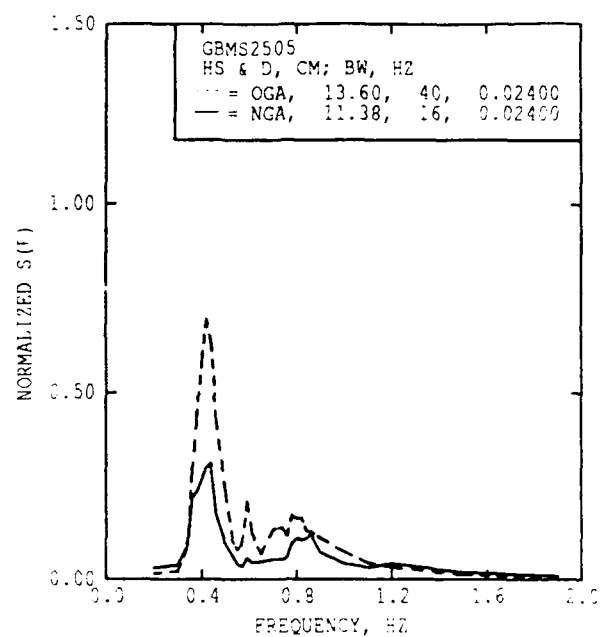




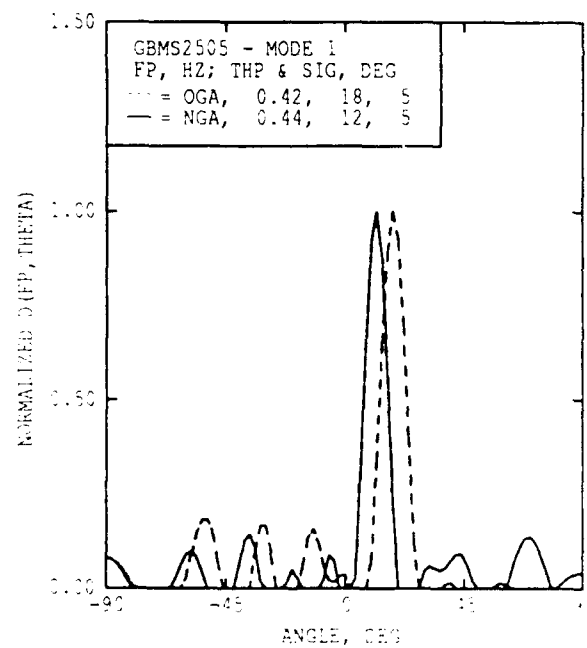
A) OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE = A



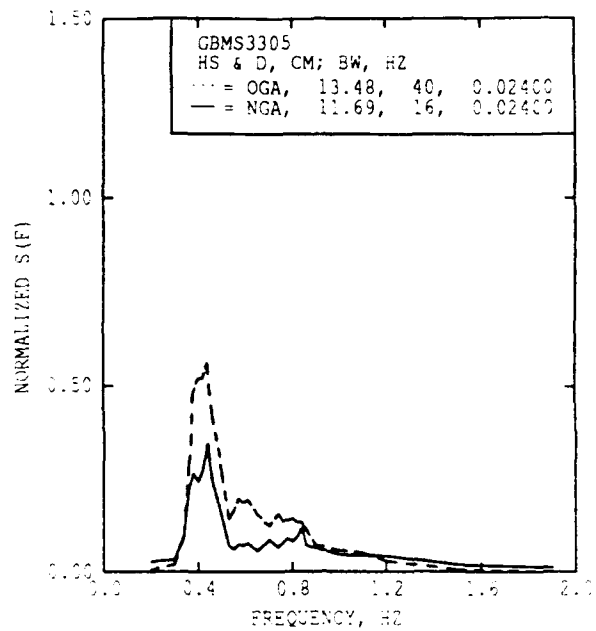
B) OGA VS. NGA SPREADING & PEAK FREQ.  
GAGE CODE = A



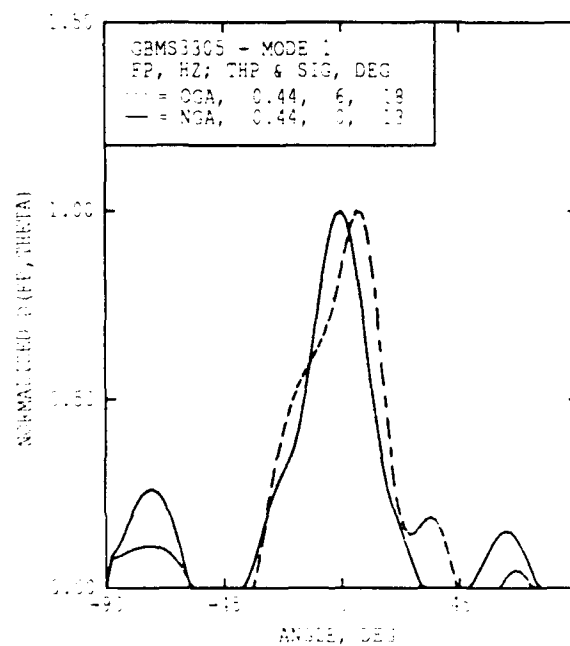
A) OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE = B



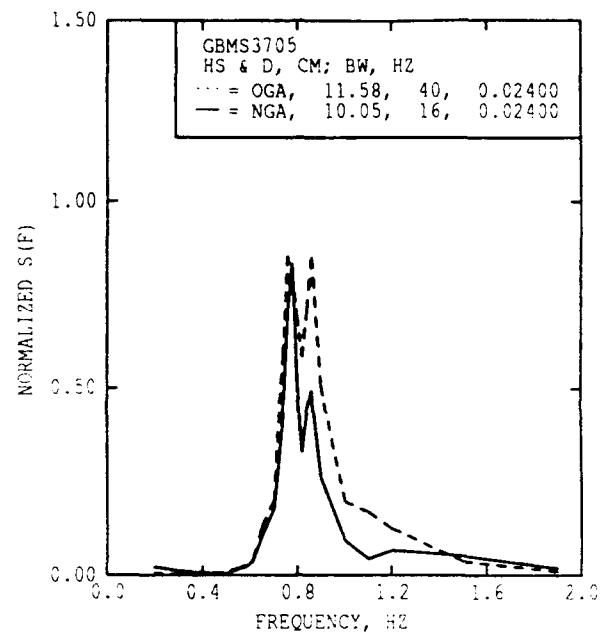
B) OGA VS. NGA SPREADING & PEAK FREQ.  
GAGE CODE = B



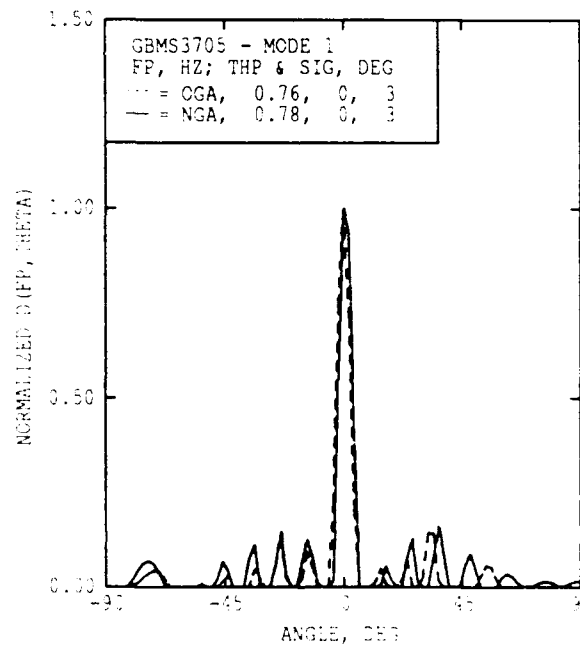
A) OGA VS. NGA FREQUENCY SPECTRA  
GAZE CODE = 0



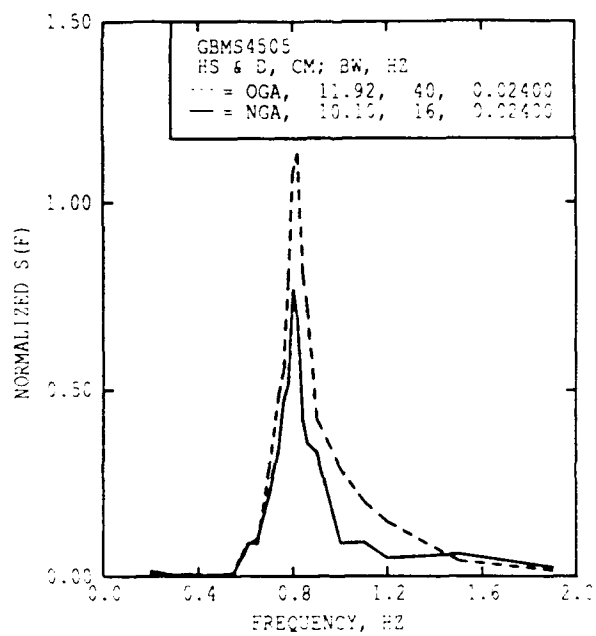
B) OGA VS. NGA SPREADING & BEAM FP-  
GAZE CODE = 0



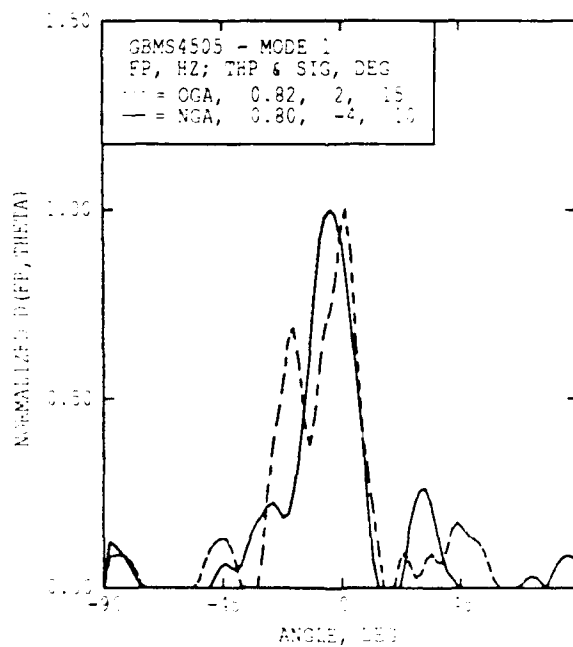
A) OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE = B



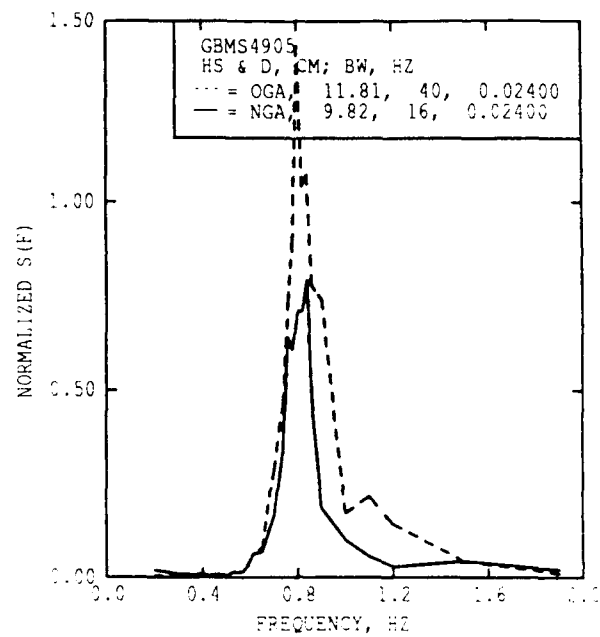
B) OGA VS. NGA SPREADING & PEAK FREQ.  
GAGE CODE = B



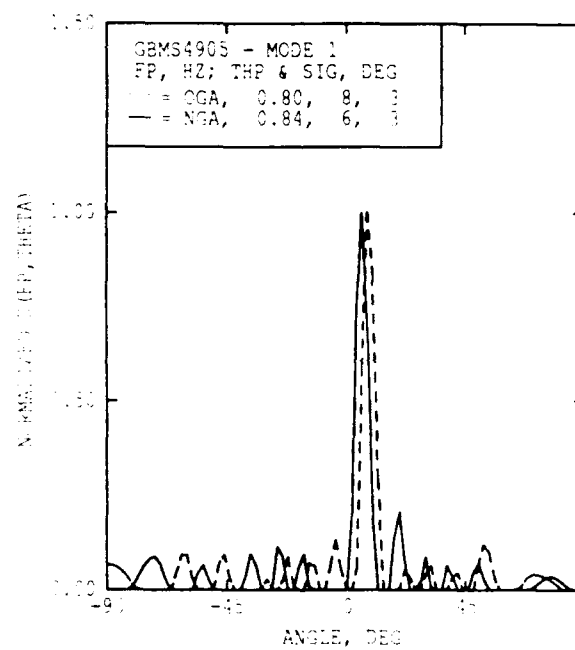
A) OGA VS. NGA FREQUENCY SPECTRA  
 GAGE CODE = C



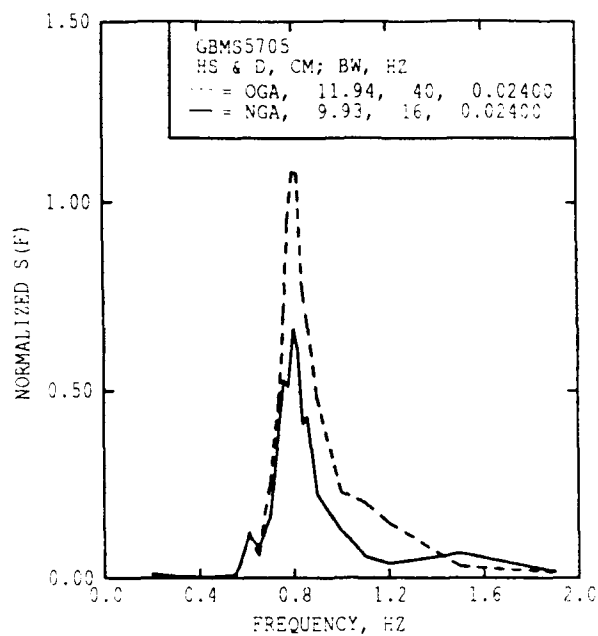
B) OGA VS. NGA DIRECTIONAL SPECTRA  
 GAGE CODE = C



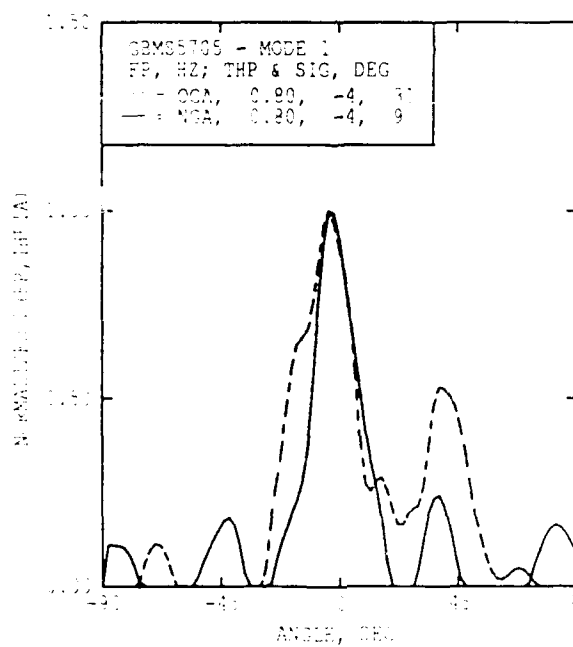
A) OGA VS. NGA FREQUENCY SPECTRA  
GATE CODE = B



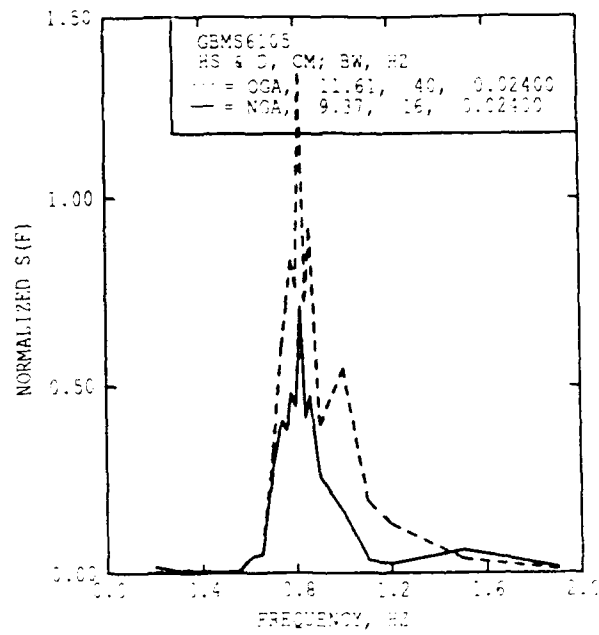
B) OGA VS. NGA SPREADING & PEAK FREQ.  
GATE CODE = B



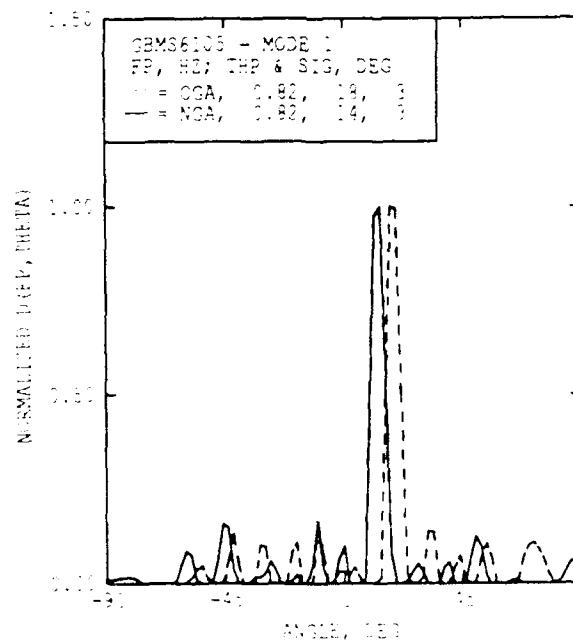
A) OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE = C



B) OGA VS. NGA SPREADING ANGLE SPECTRA  
GAGE CODE = C

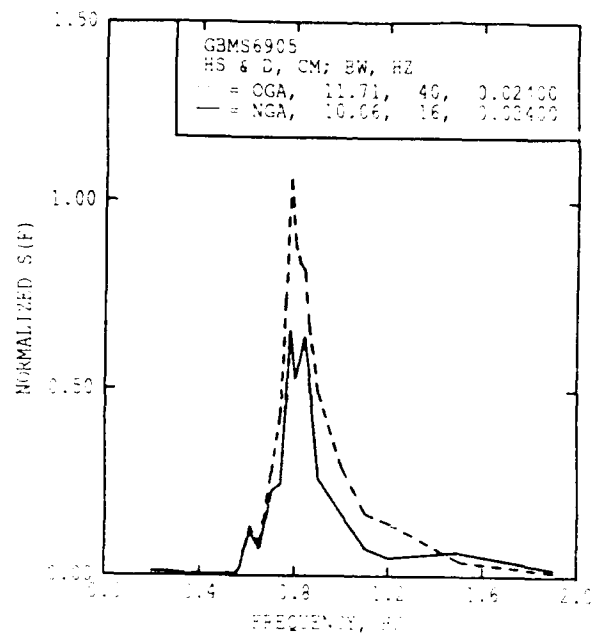


A) OGA VS. NGA FREQUENCY SPECTRA  
CASE CODE = B

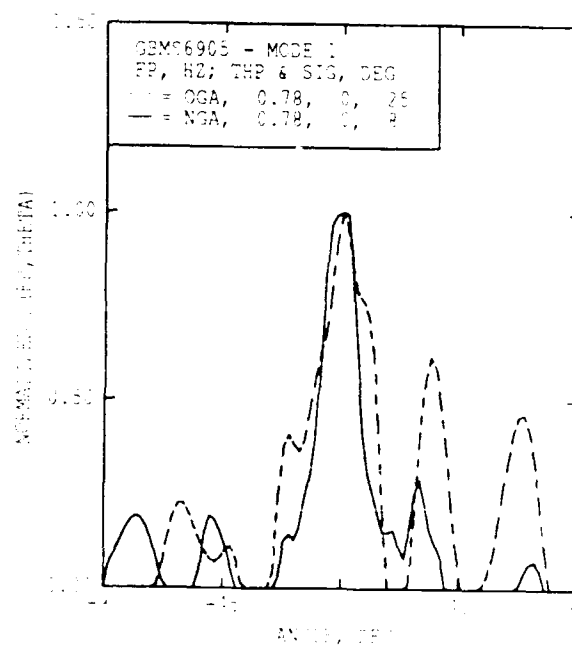


B) OGA VS. NGA DIRECTIVITY PATTERN  
CASE CODE = B

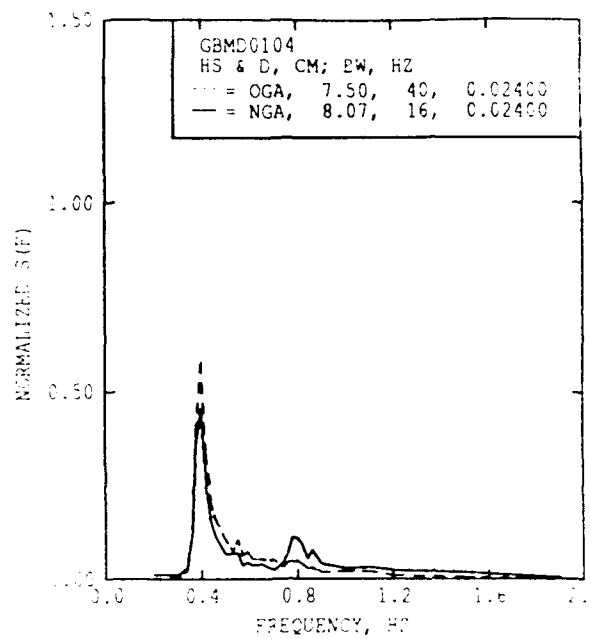




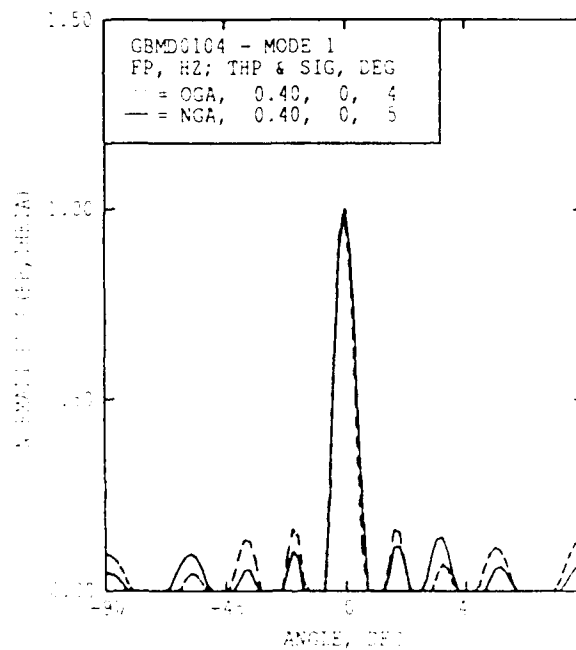
A) OGA vs. NGA FREQUENCY SPECTRA  
CASE 1000 - A



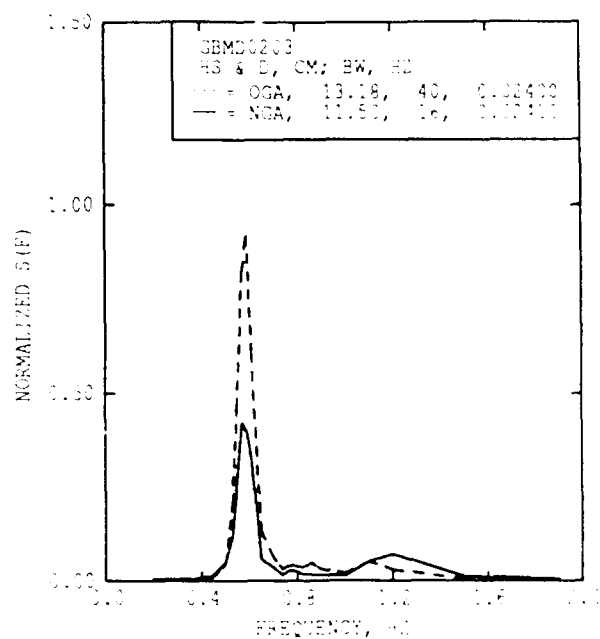
B) OGA vs. NGA DIRECTIONAL SPECTRA  
CASE 1000 - A



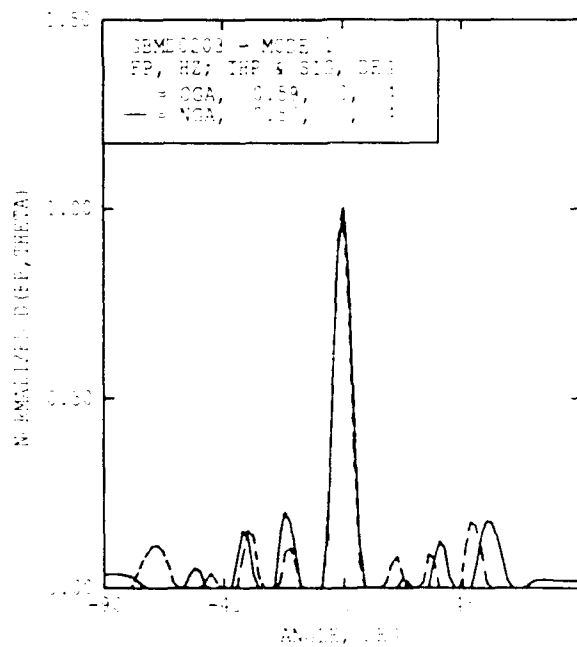
A) OGA VS. NGA FREQUENCY SPECTRA  
 CASE CODE = B



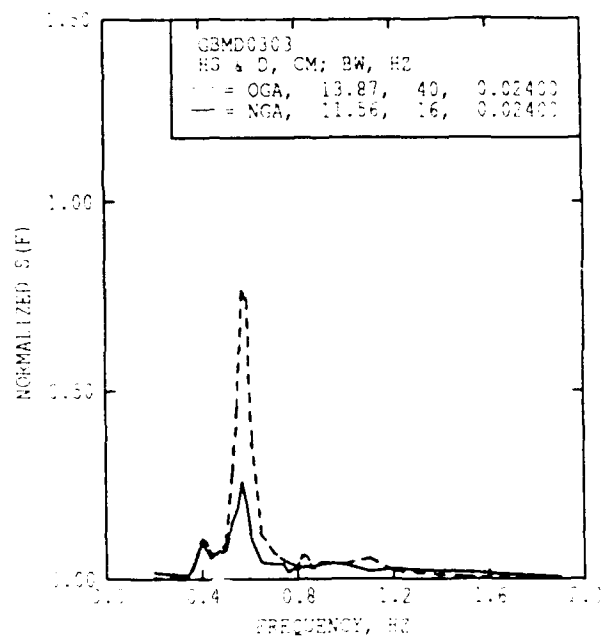
B) OGA VS. NGA DIRECTIONAL SPECTRA  
 CASE CODE = B



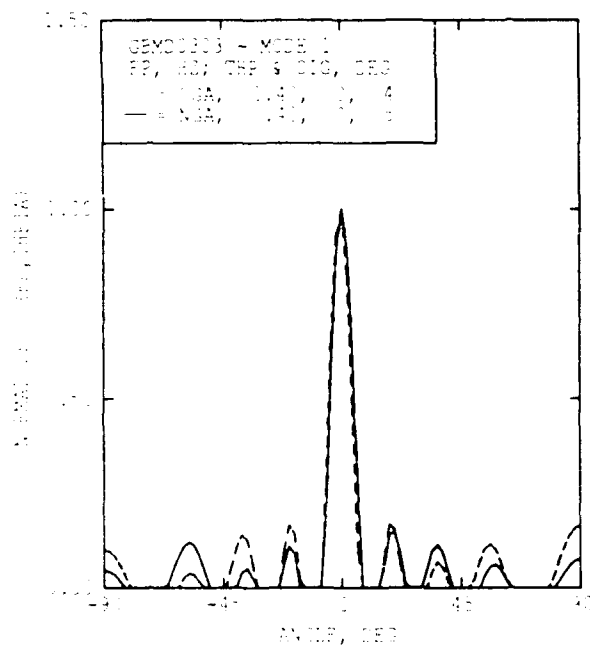
10. 13A. VS. NGA FREQUENCY SPECTRA  
CASE 1 DE 10.8



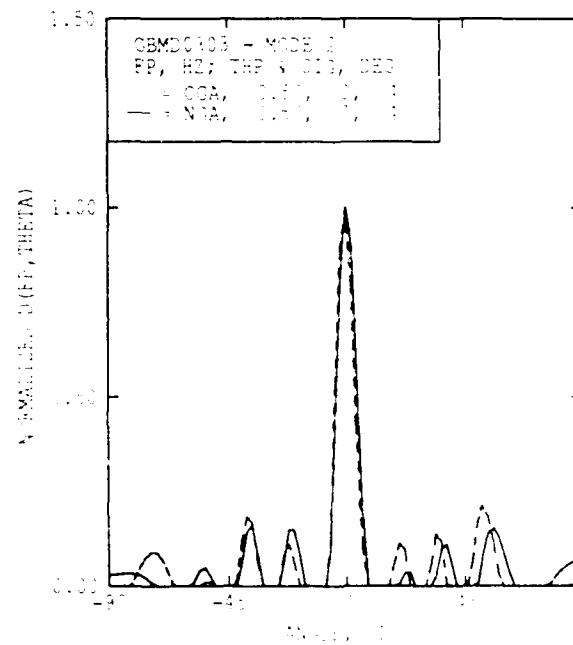
11. 13A VS. NGA DIFF. ANG. SPECTRA - 10.8  
CASE 1 DE 10.8



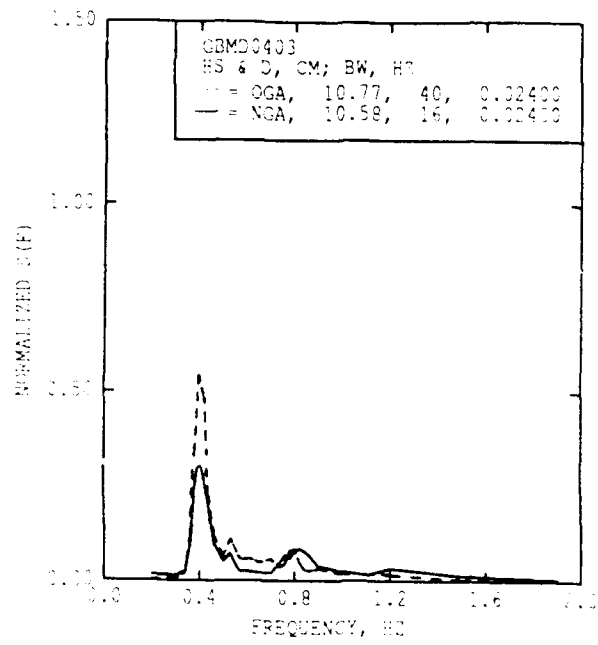
A) OGA VS. NGA FREQUENCY SPECTRA  
 CASE 116 - B



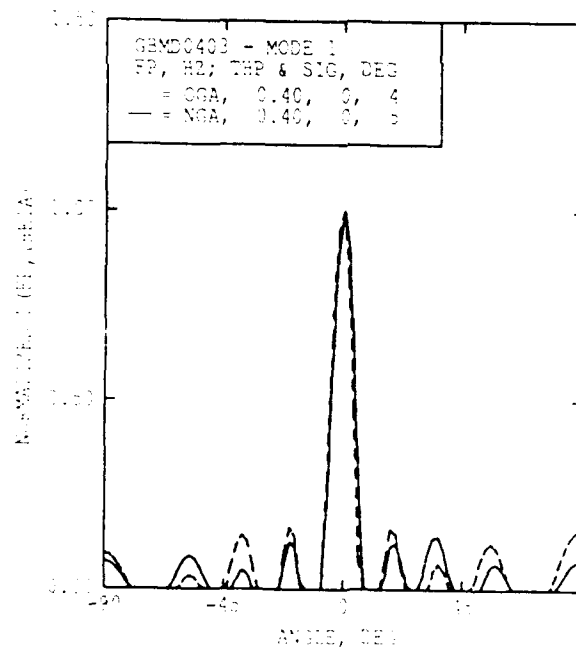
A) OGA VS. NGA ANGLE AND FREQ. SPECTRA  
 CASE 116 - B



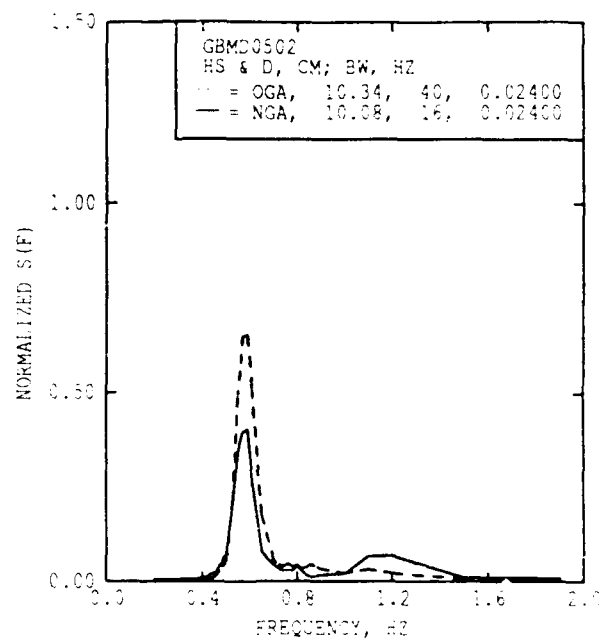
A) OGA VS. NGA ANGLE AND FREQ. SPECTRA  
 CASE 116 - B



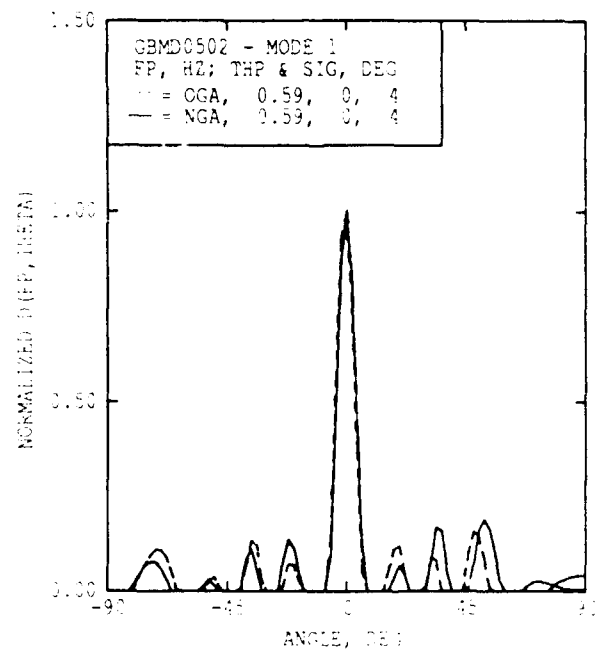
A) OGA VS. NGA FREQUENCY SPECTRA  
 CASE 1000 - B



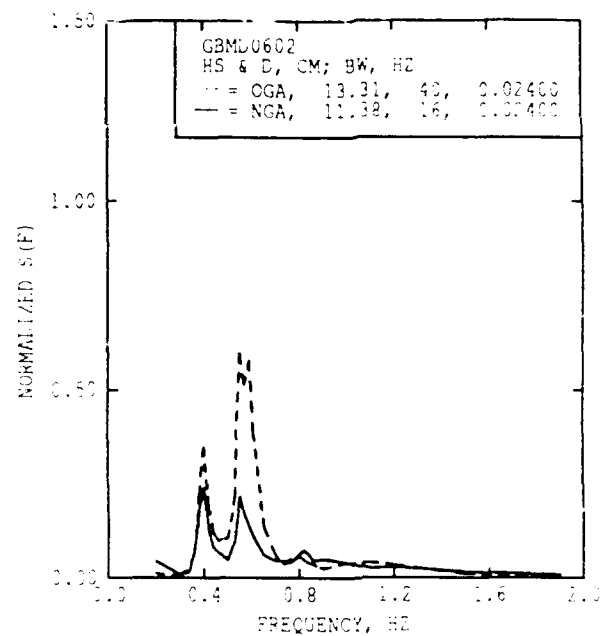
B) OGA VS. NGA OFFREADING - 10000 FPS.  
 CASE 1000 - B



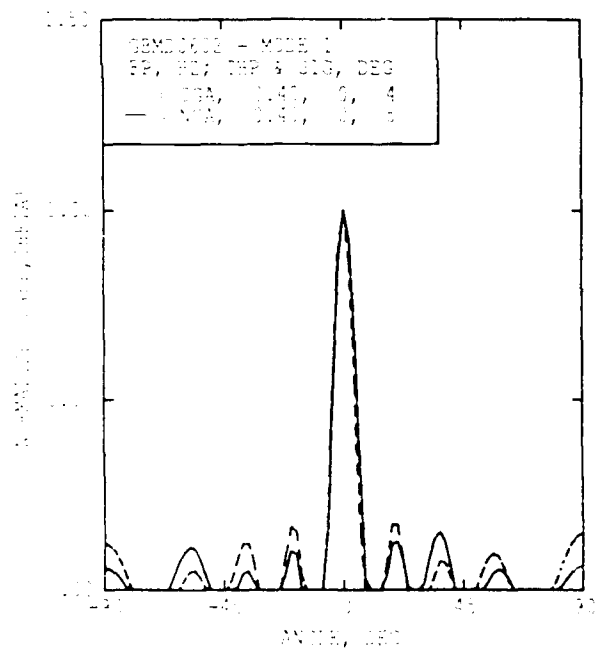
A) OGA VS. NGA FREQUENCY SPECTRA  
PAGE CODE = B



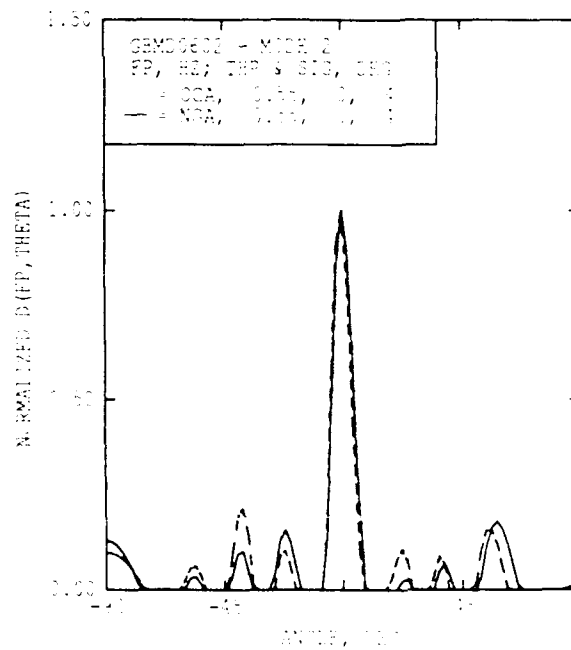
B) OGA VS. NGA OPERATING & BEAK FREQ  
PAGE CODE = F



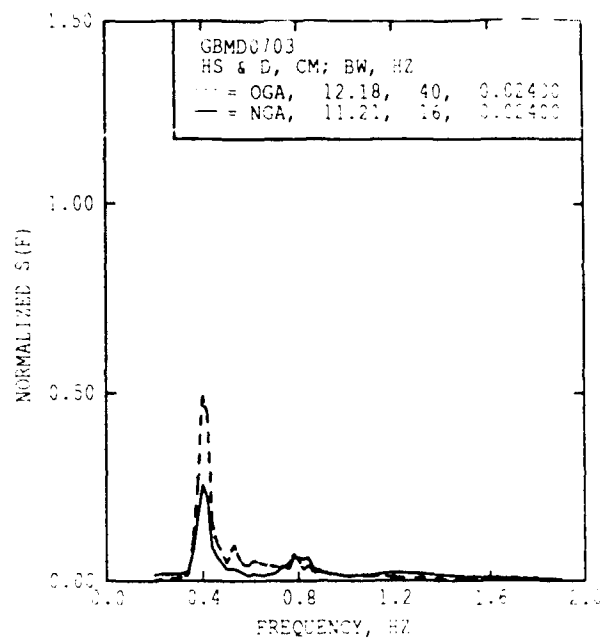
A) OGA VS. NGA FREQUENCY SPECTRA  
PAGE CODE = B



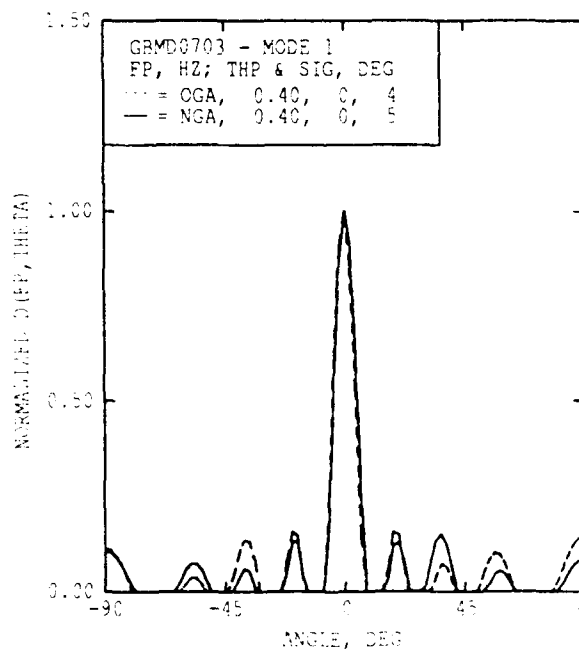
B) OGA VS. NGA RADIATION PATTERN PEAK PROFILE  
PAGE CODE = C



C) OGA VS. NGA RADIATION PATTERN PEAK PROFILE  
PAGE CODE = D

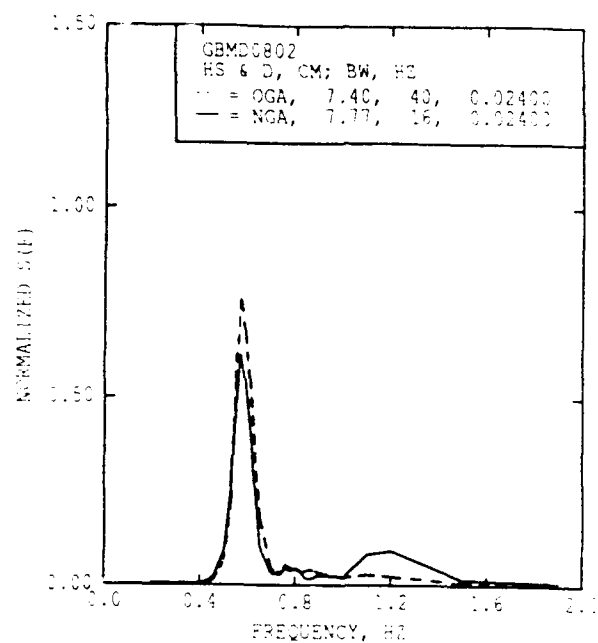


A) OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE = B

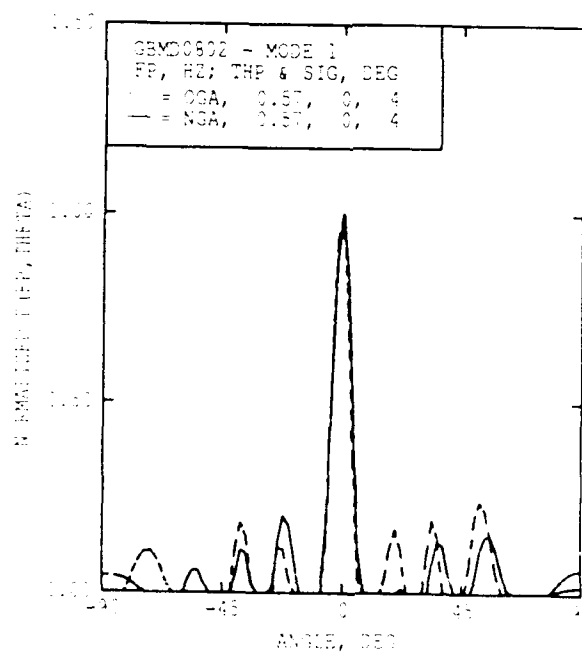


B) OGA VS. NGA SPREADING PEAK PROFILE  
GAGE CODE = B

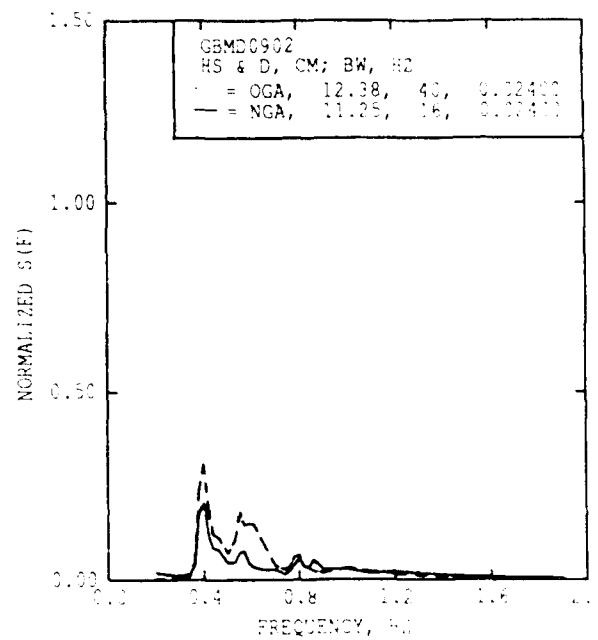




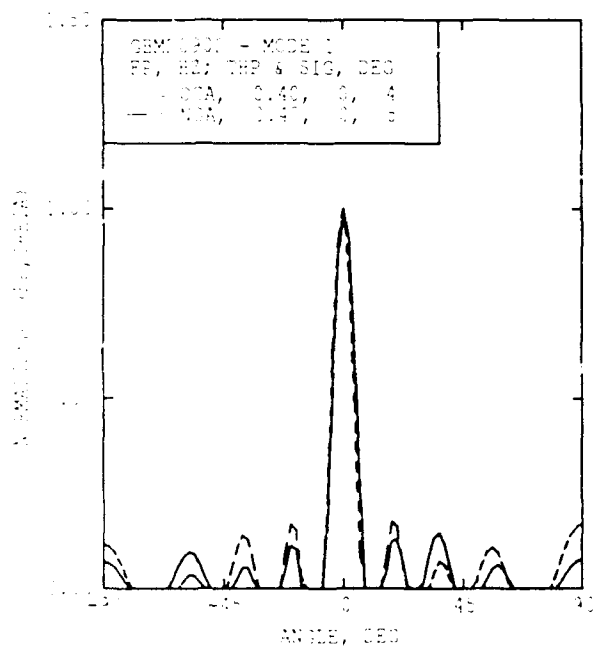
A) OGA VS. NGA FREQUENCY SPECTRA  
CASE CODE = B



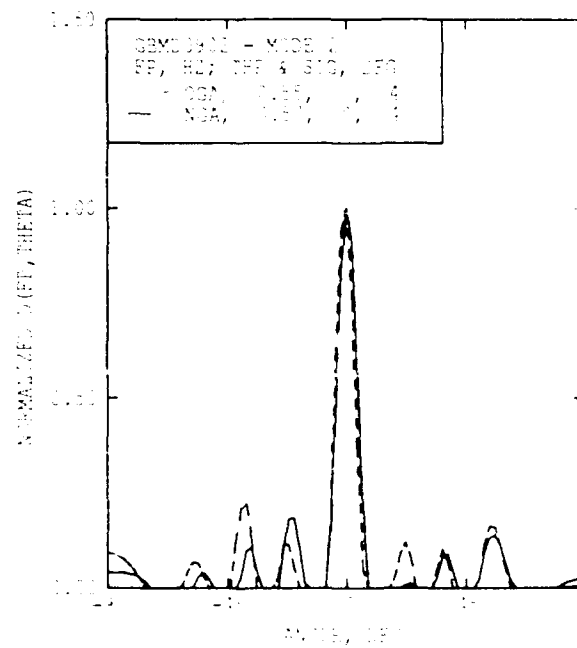
B) OGA VS. NGA DIRECTIONAL PEAK RESP.  
CASE CODE = B



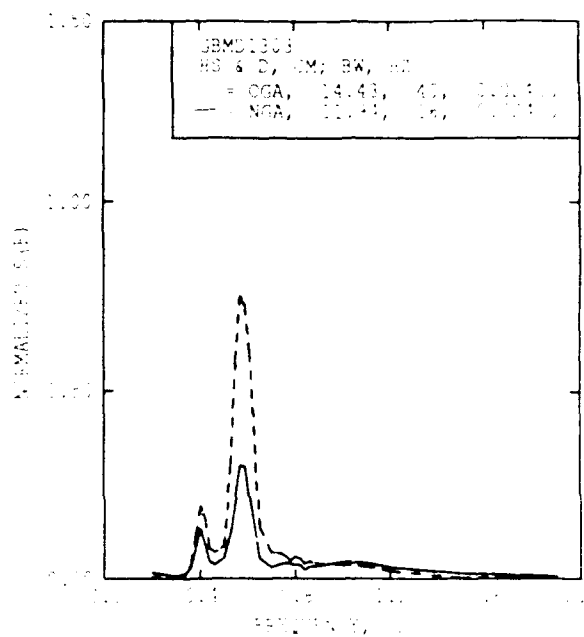
A) OGA VS. NGA FREQUENCY SPECTRA  
CASE 102 - B



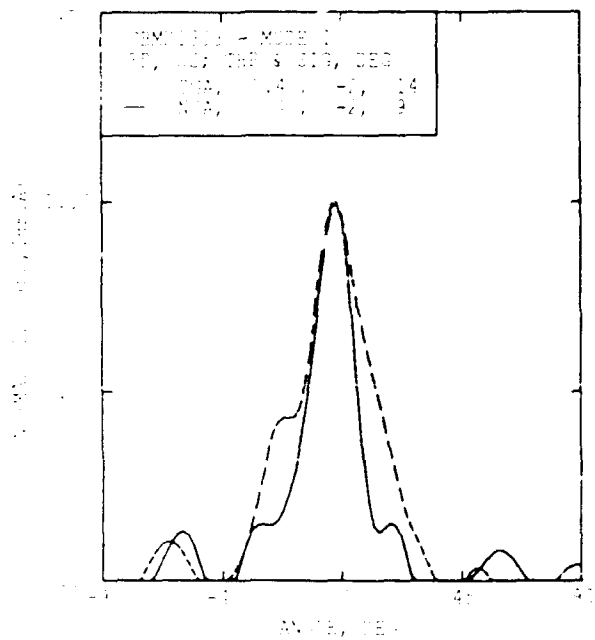
B) OGA VS. NGA DISTRIBUTION OF ANGLES  
CASE 102 - B



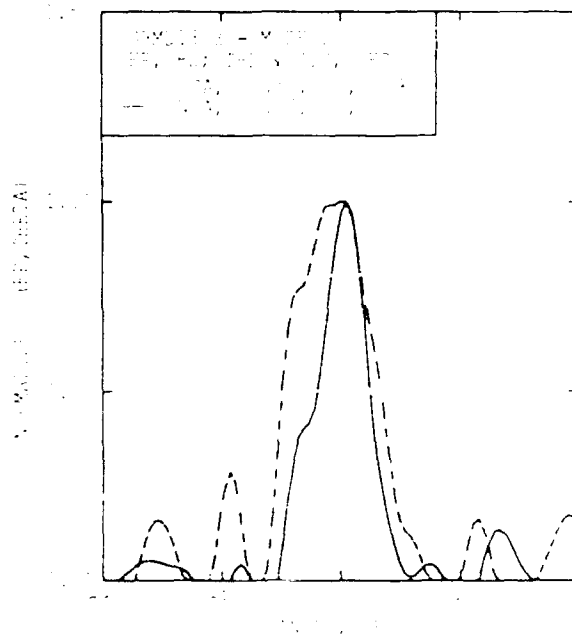
C) OGA VS. NGA DISTRIBUTION OF ANGLES  
CASE 102 - B



A. CGA & NGA P&B, BASE OF DIA  
Z<sub>1</sub> = 1.0



B. CGA & NGA QUANTITATIVE P&B, DIA  
Z<sub>1</sub> = 1.0



C. CGA & NGA QUANTITATIVE P&B, DIA  
Z<sub>1</sub> = 1.0

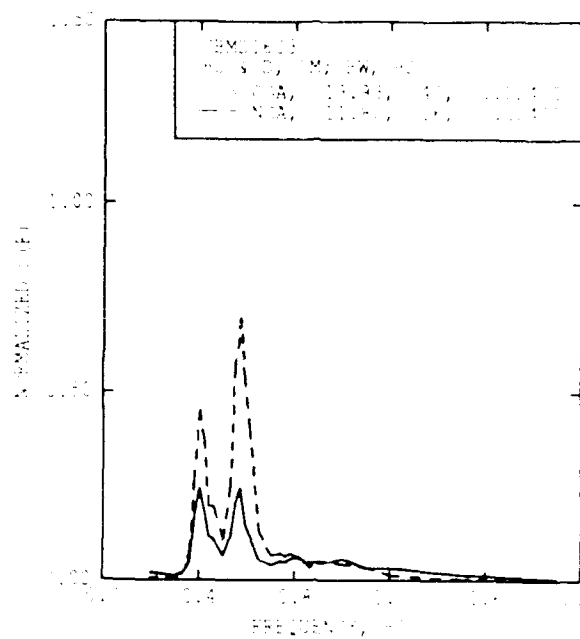


Figure 12. Normalized Power vs Frequency for Example 11.

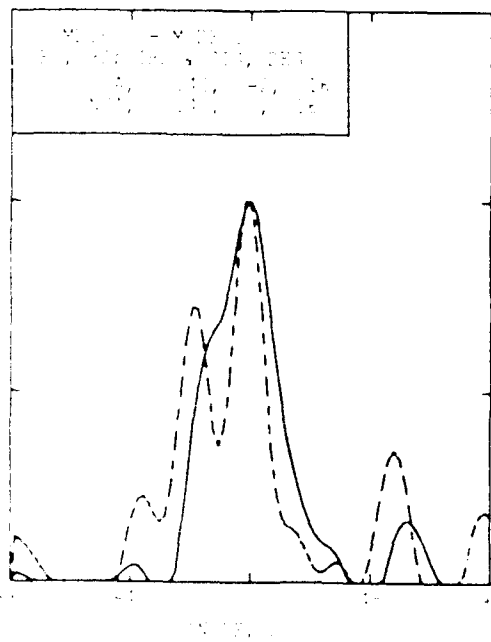


Figure 13. Normalized Power vs Frequency for Example 12.

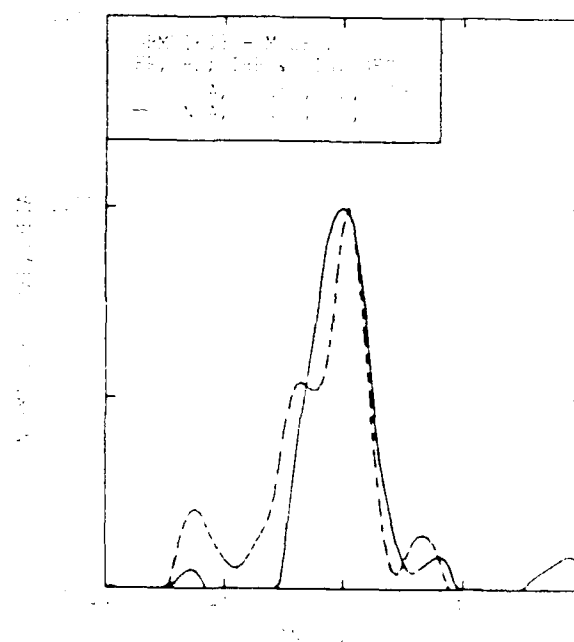
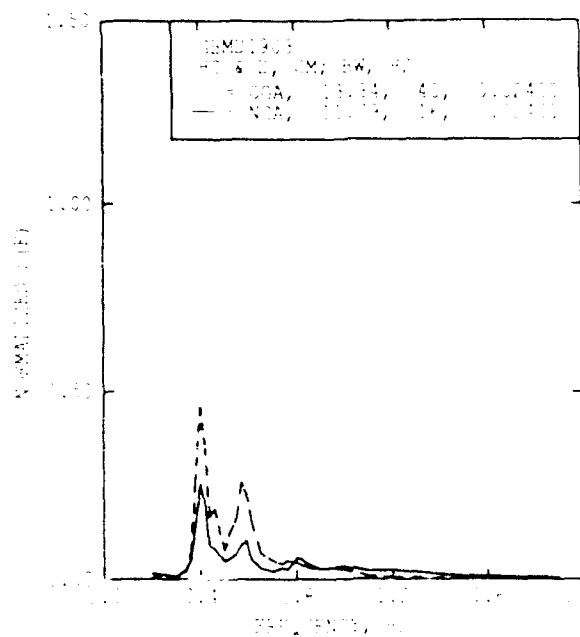
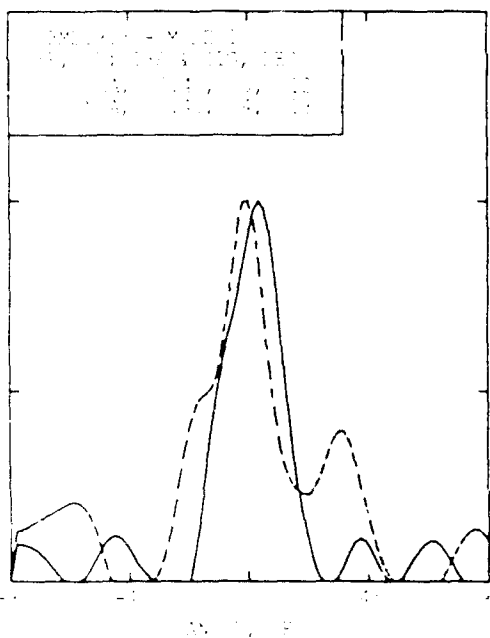


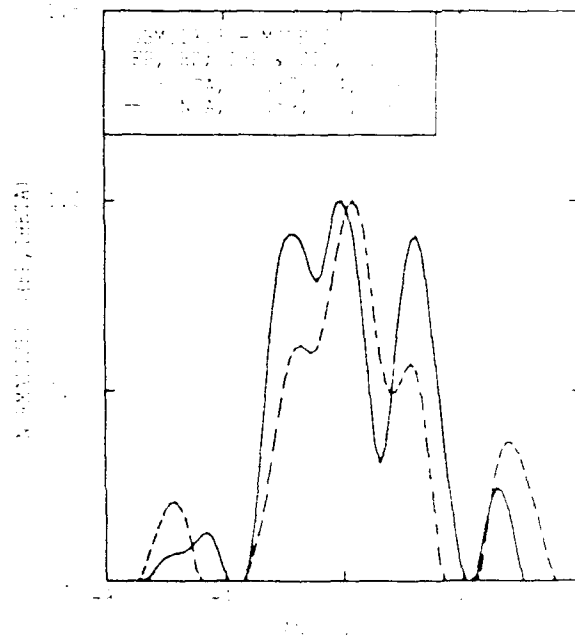
Figure 14. Normalized Power vs Frequency for Example 13.



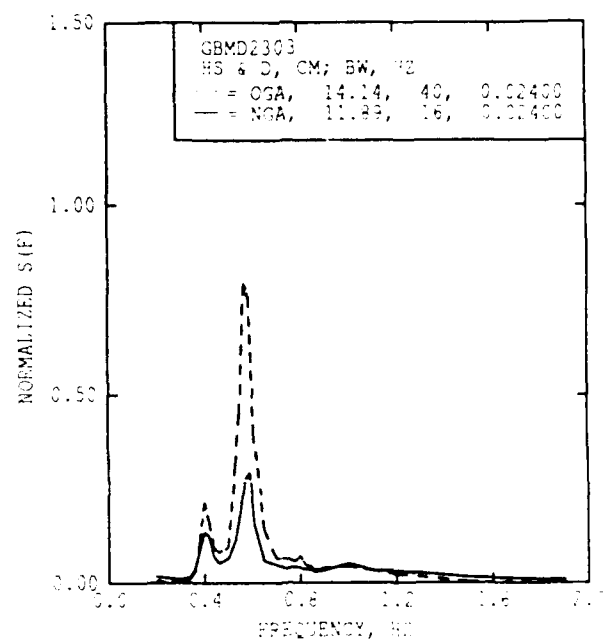
A: 1.00A, 10.00, 40, 20.00  
 B: 1.00B, 10.00, 40, 20.00



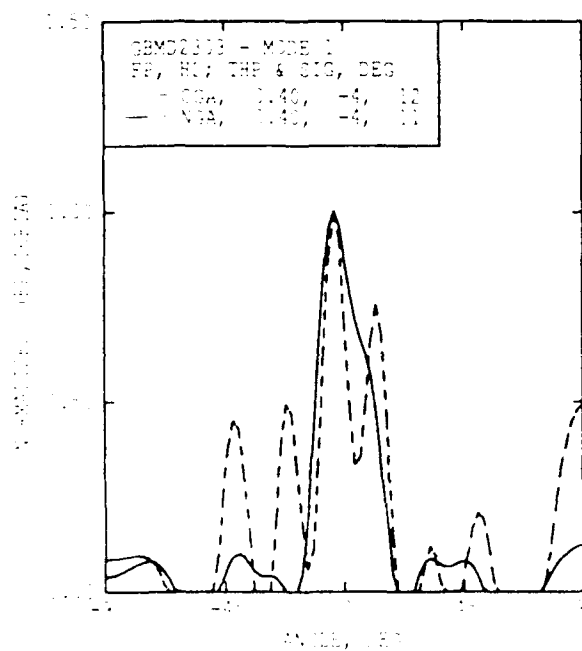
A: 1.00A, 10.00, 40, 20.00  
 B: 1.00B, 10.00, 40, 20.00



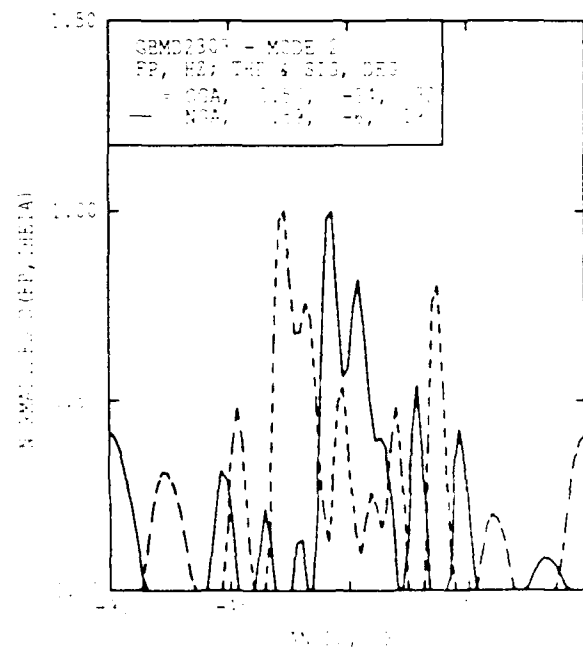
A: 1.00A, 10.00, 40, 20.00  
 B: 1.00B, 10.00, 40, 20.00



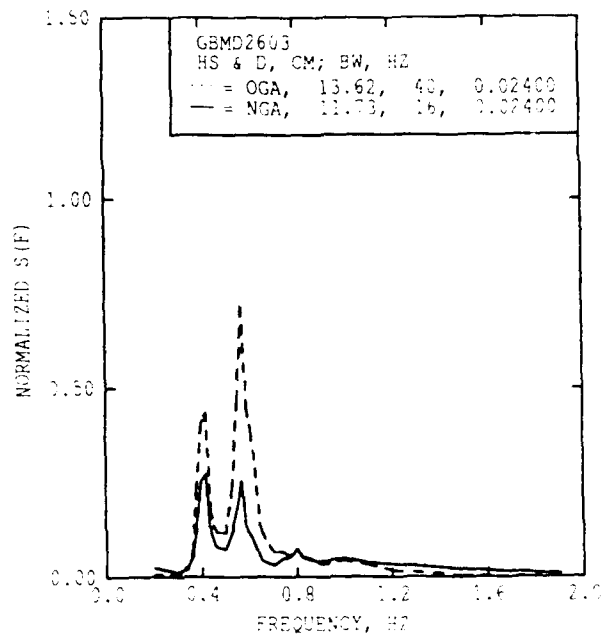
AN OGA VS. NGA FREQUENCY SPECTRA  
CASE CODE = R



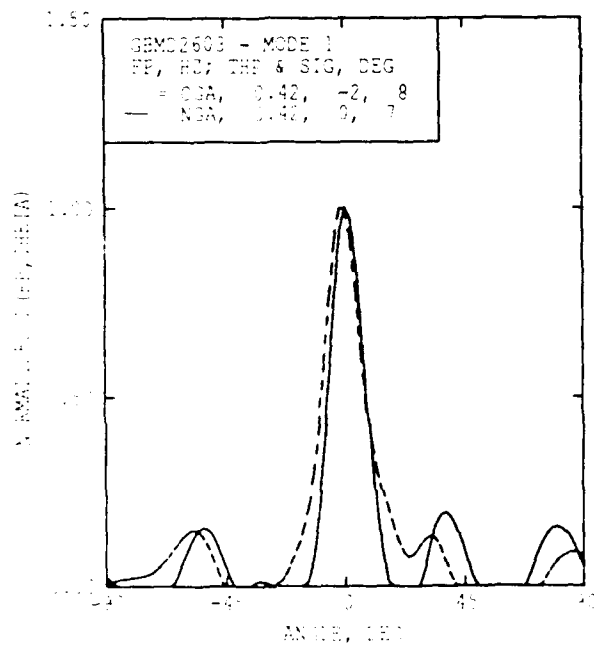
AN OGA VS. NGA ANGLE SPECTRA  
CASE CODE = R



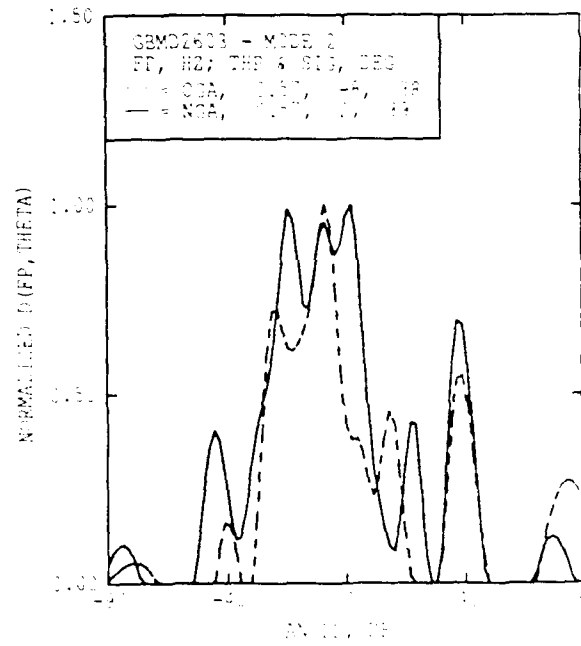
AN OGA VS. NGA ANGLE SPECTRA  
CASE CODE = R



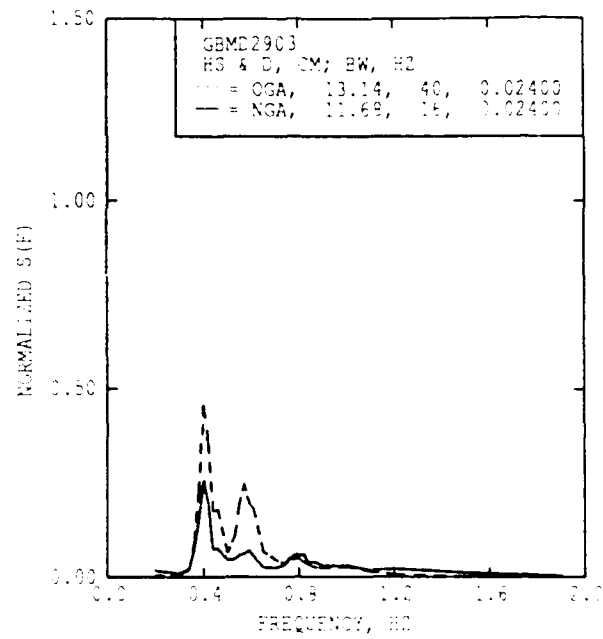
A) OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE = 0



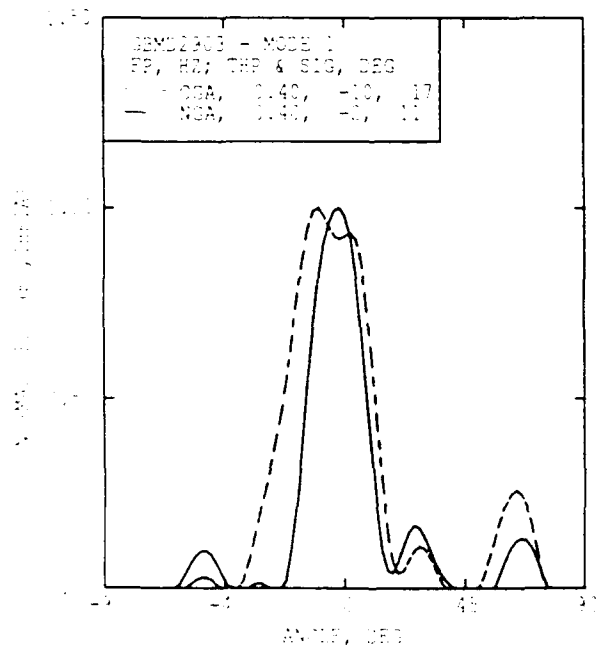
B) A vs. NGA SPREADING BEAM PROFILE  
GAGE CODE = 0



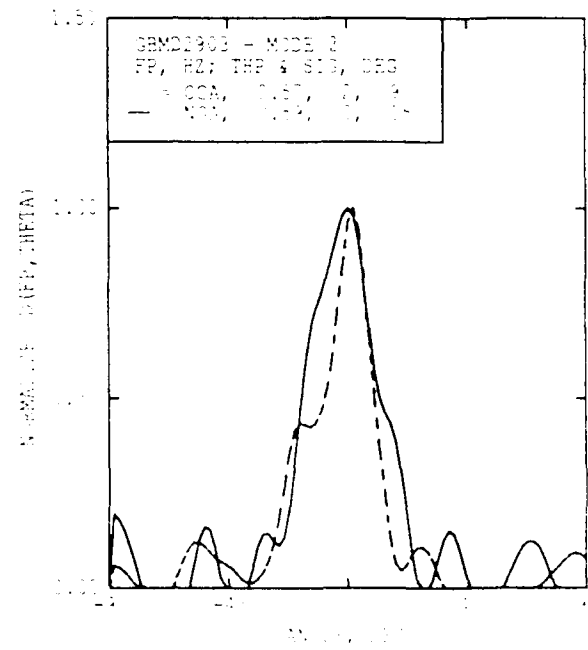
C) A vs. NGA SPREADING BEAM PROFILE  
GAGE CODE = 0



A1 OGA VS. NGA FREQUENCY SPECTRA  
CASE CODE = A

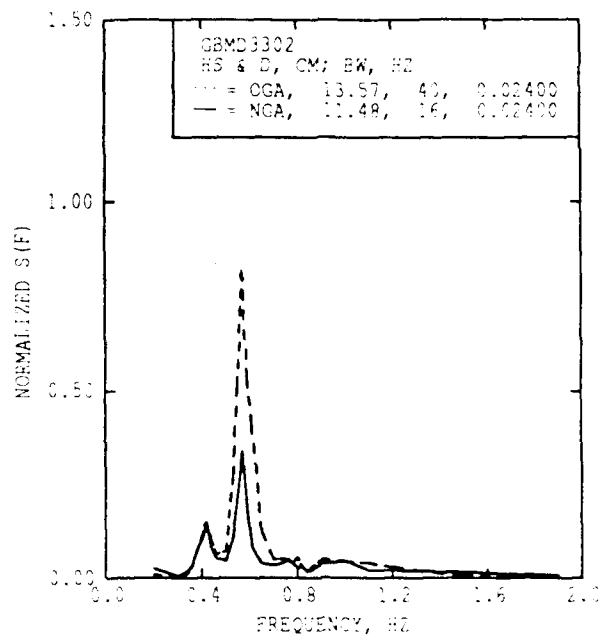


A2 OGA VS. NGA ANGLE & BEAK FREQ  
CASE CODE = A

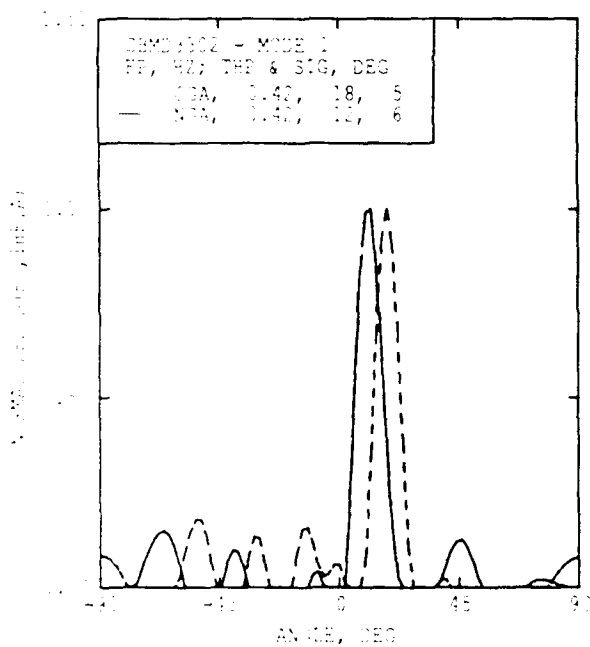


A3 OGA VS. NGA ANGLE & BEAK FREQ  
CASE CODE = A

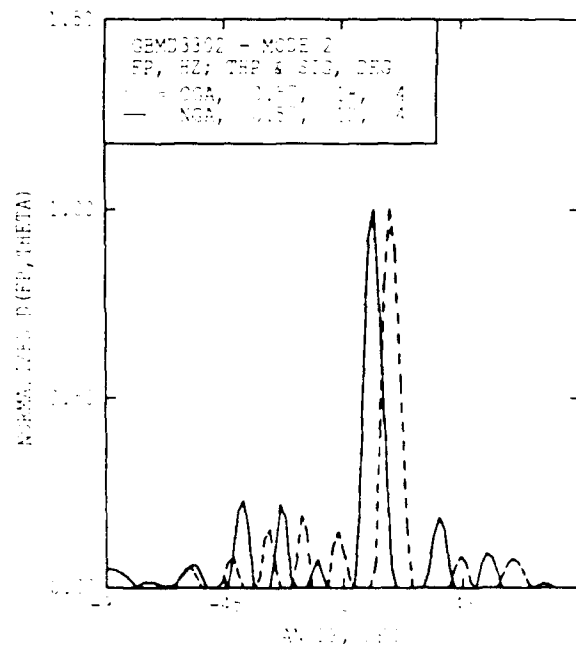




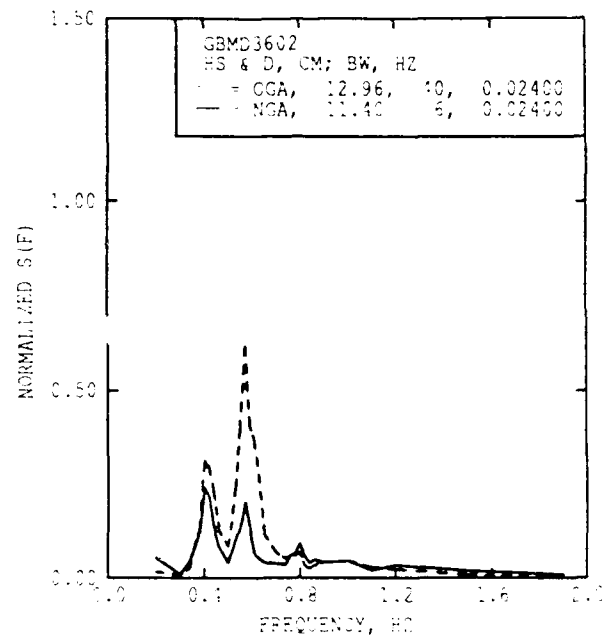
A3 OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE - E



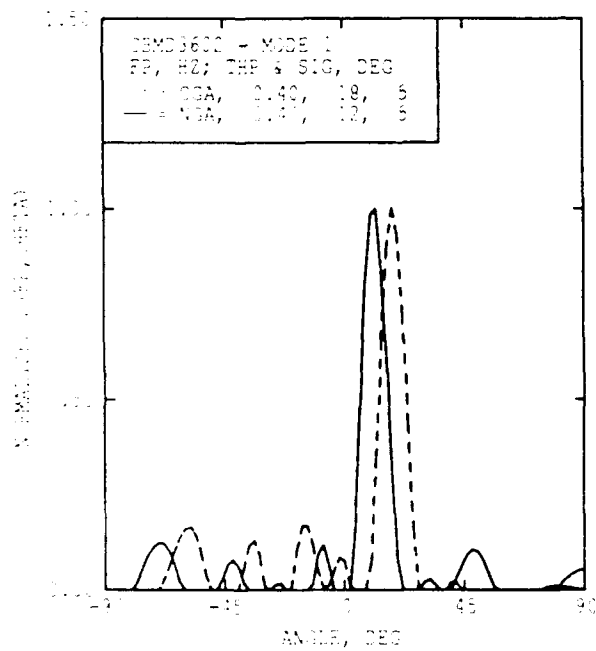
B3 OGA VS. NGA ANGULAR DISTRIBUTION  
GAGE CODE - E



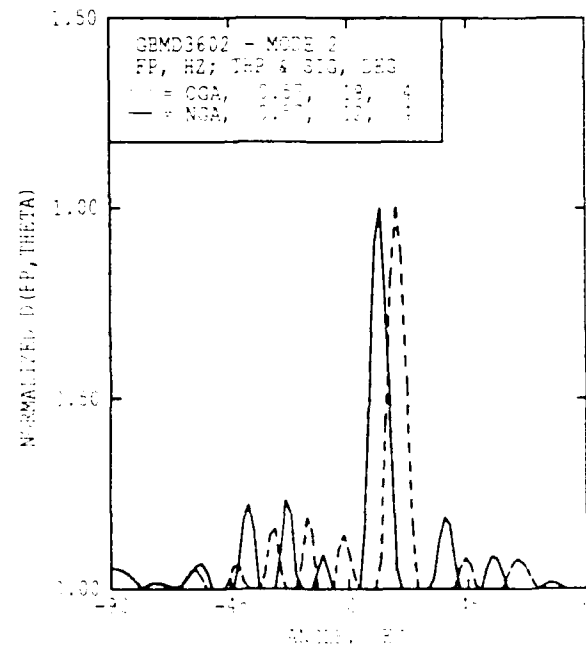
B3 OGA VS. NGA ANGULAR DISTRIBUTION  
GAGE CODE - E



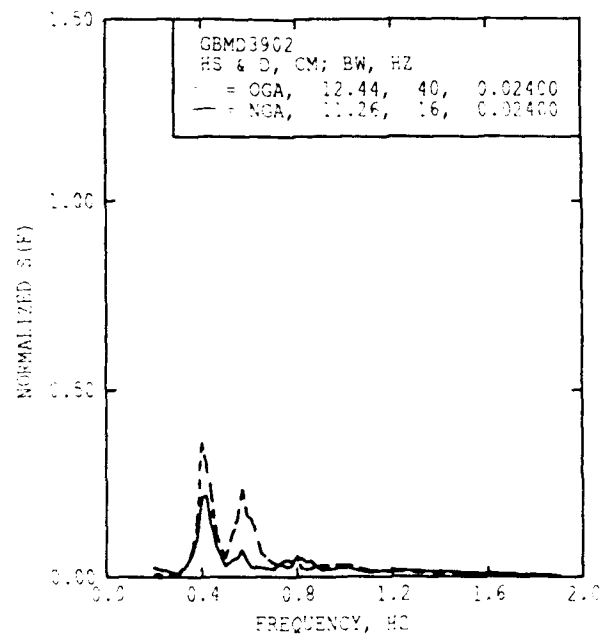
A) CGA VS. NGA FREQUENCY SPECTRA  
BASE MODE = B



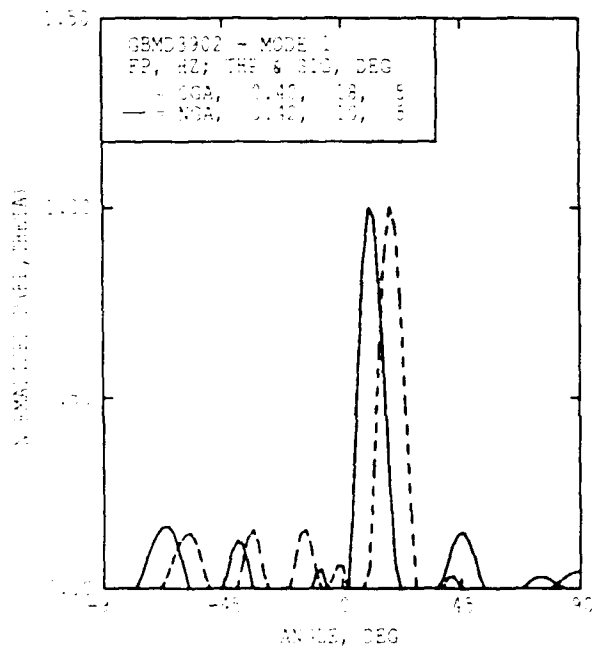
B) CGA VS. NGA ORIENTATION - BASE FREQ  
MODE = B



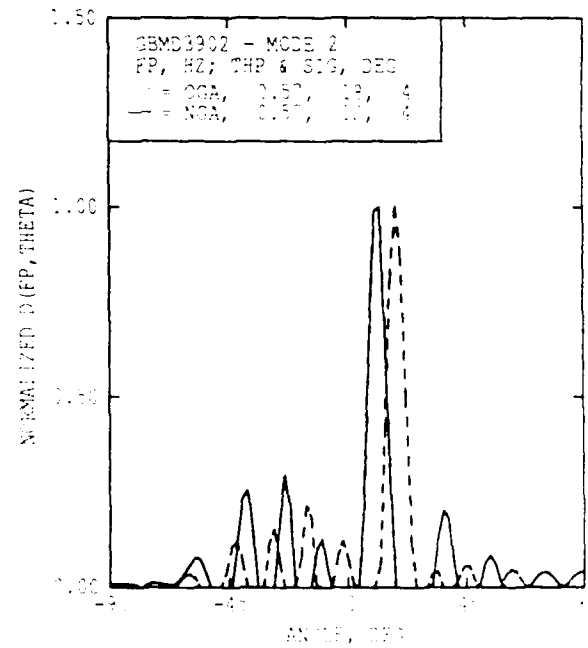
C) CGA VS. NGA ORIENTATION - 2ND FREQ  
MODE = B



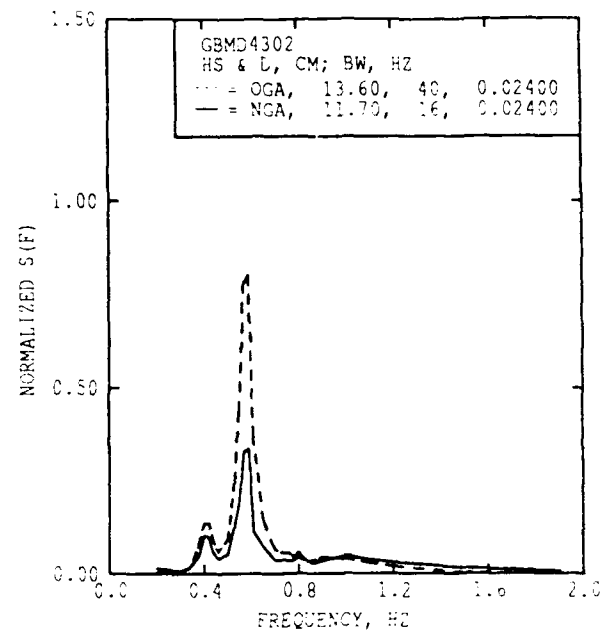
A) OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE = B



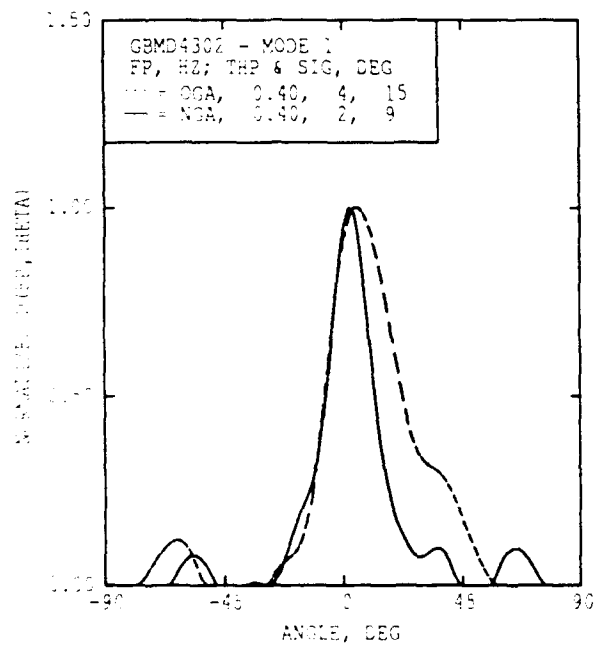
B) OGA VS. NGA DIRECTIVITY & PEAK FREQ  
GAGE CODE = B



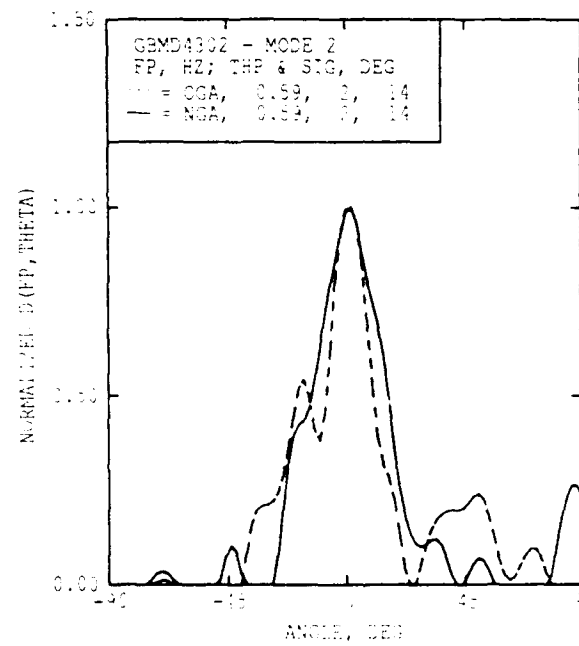
C) OGA VS. NGA DIRECTIVITY & PEAK FREQ  
GAGE CODE = B



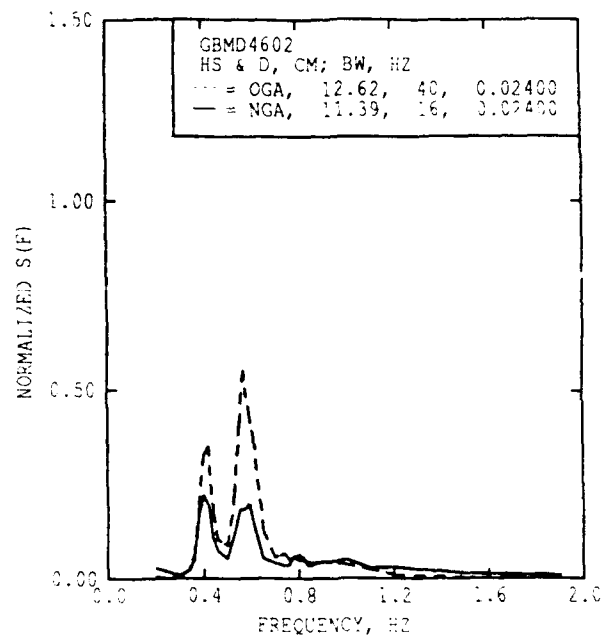
A) OGA VS. NGA FREQUENCY SPECTRA  
PAGE CODE = A



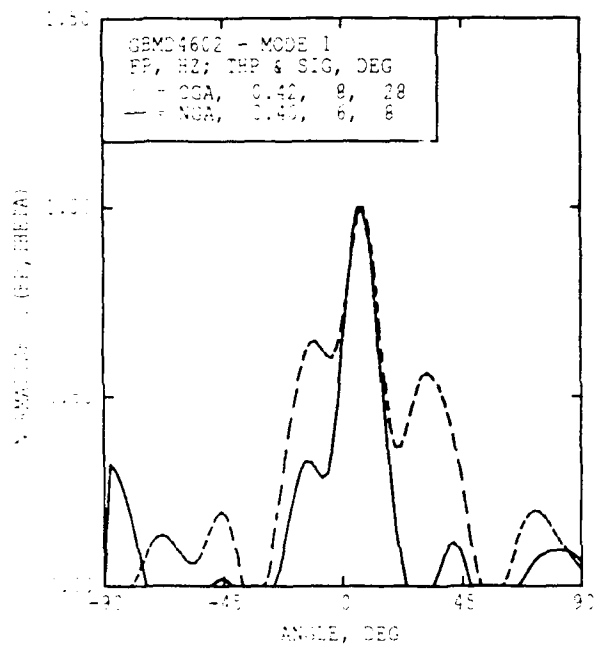
B) OGA VS. NGA SPREADING @ PEAK FREQ  
PAGE CODE = A



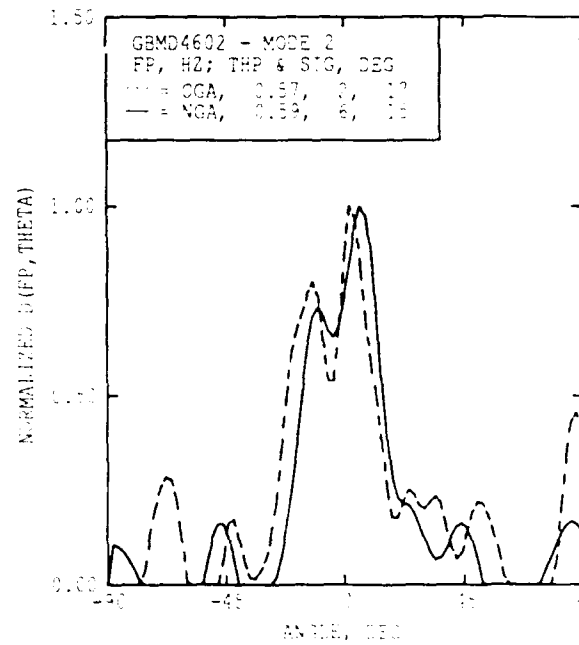
C) OGA VS. NGA SPREADING @ PEAK FREQ  
PAGE CODE = A



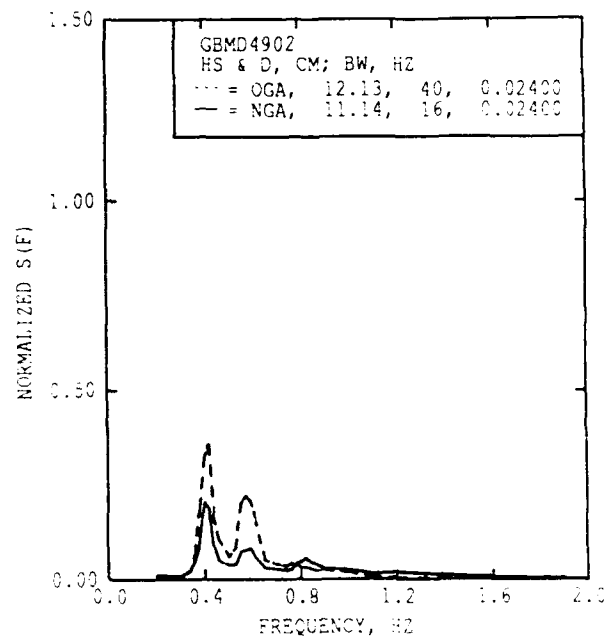
A) OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE = A



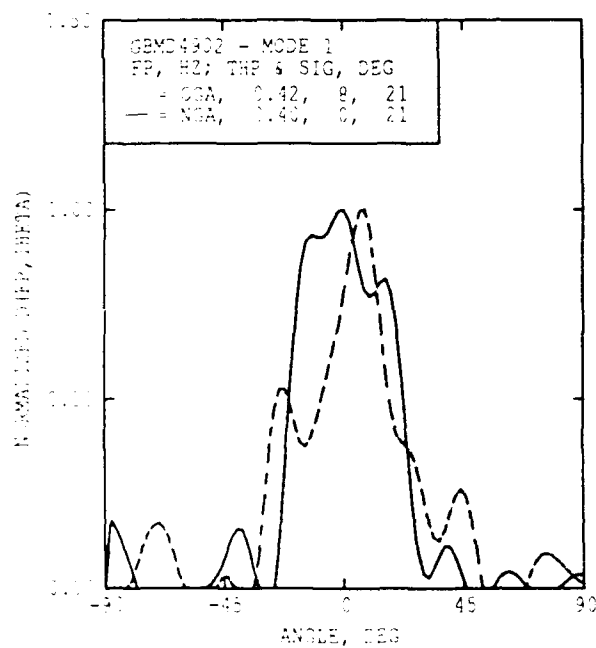
B) OGA VS. NGA SPREADING @ PEAK FREQ  
GAGE CODE = A



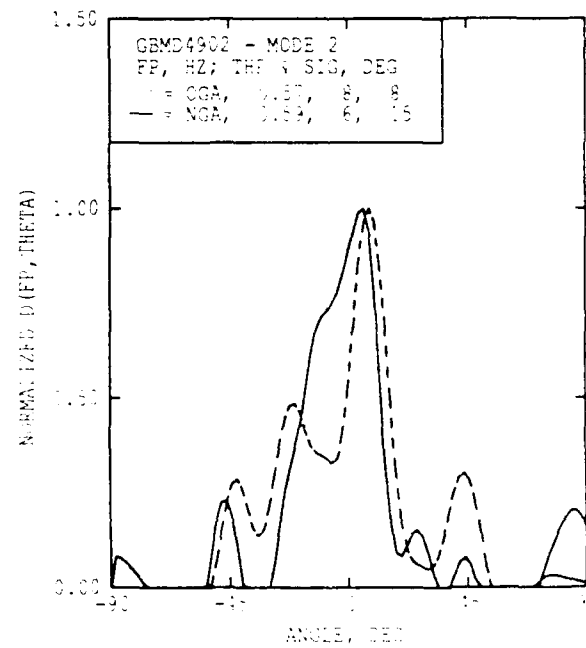
C) OGA VS. NGA SPREADING @ PEAK FREQ  
GAGE CODE = A



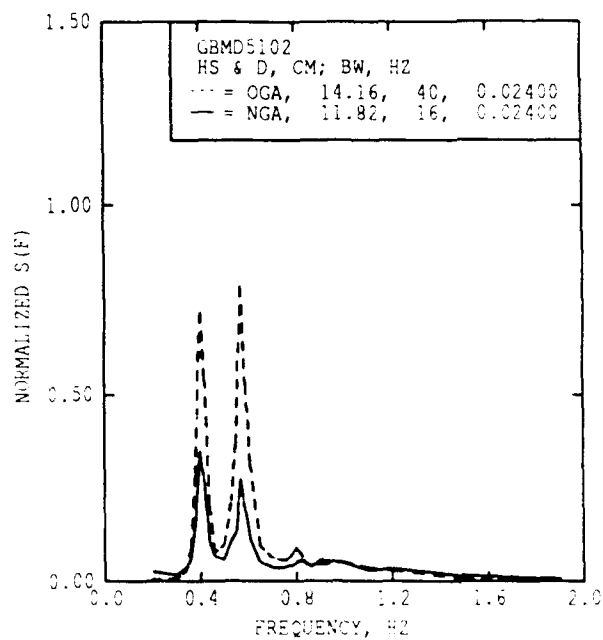
A) OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE = A



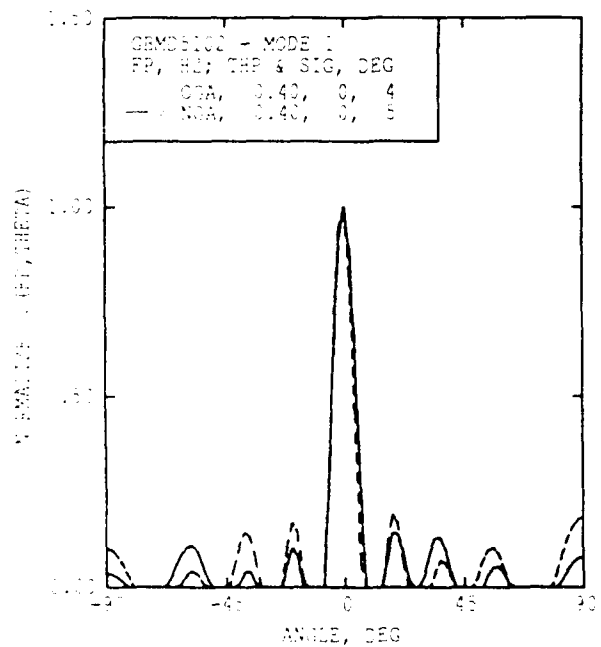
B) OGA VS. NGA DIRECTIONAL & PEAK FREQ  
GAGE CODE = A



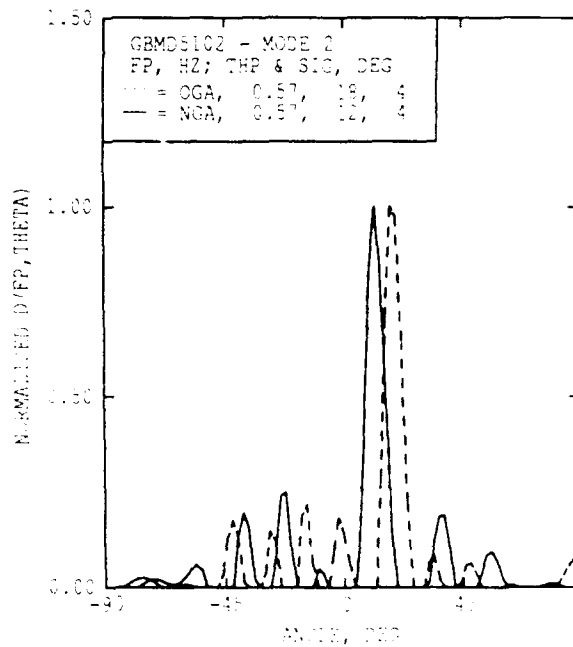
C) OGA VS. NGA DIRECTIONAL & PEAK FREQ  
GAGE CODE = A



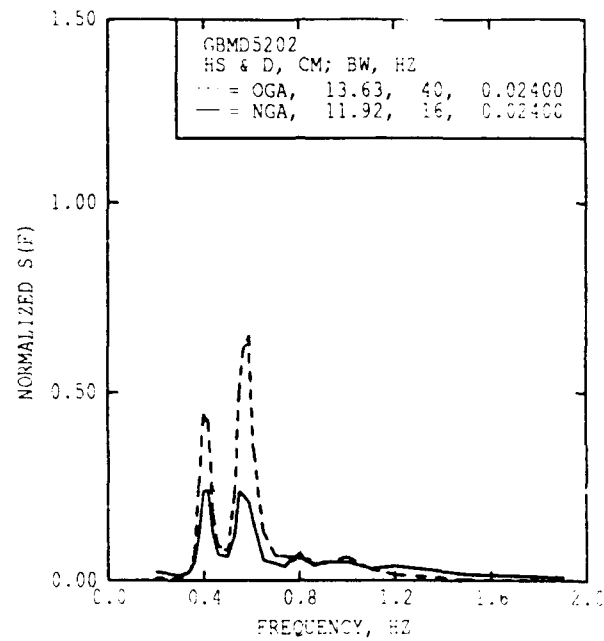
A) OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE = B



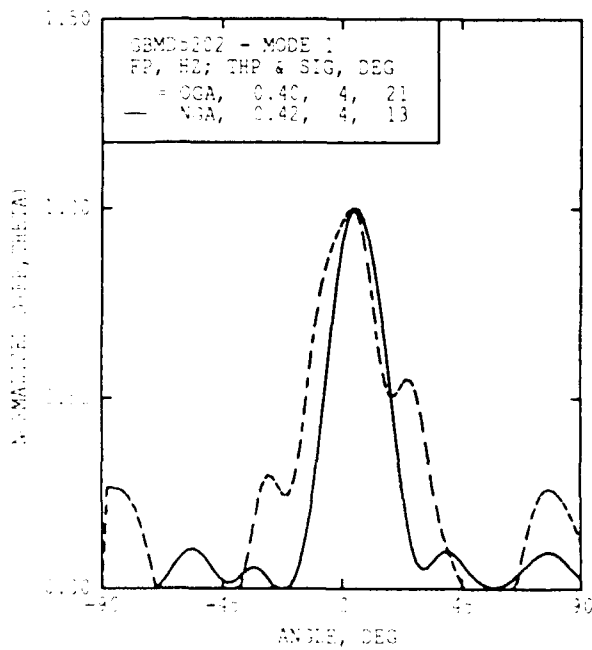
B) OGA VS. NGA DIFFRACTION & PEAK FREQ  
GAGE CODE = B



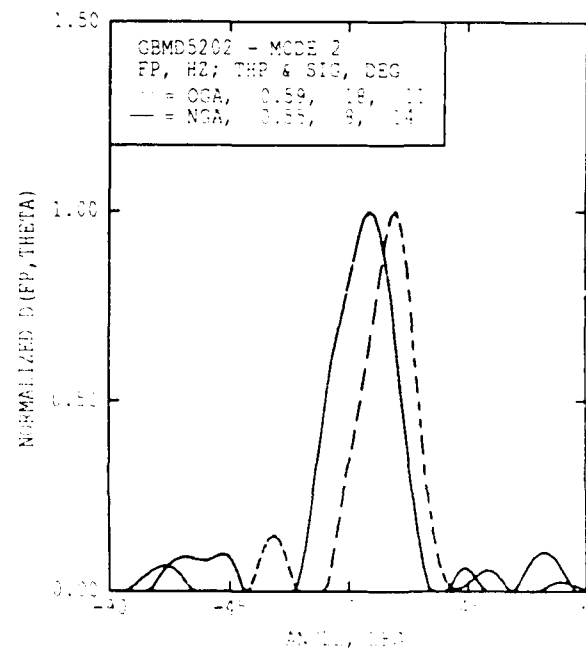
C) OGA VS. NGA DIFFRACTION & PEAK FREQ  
GAGE CODE = B



A) OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE = C

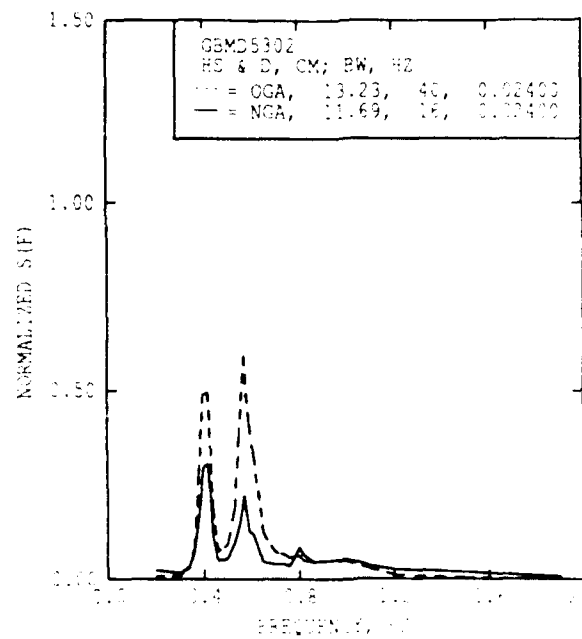


B) OGA VS. NGA DIRECTIVITY & PEAK FREQ  
GAGE CODE = C

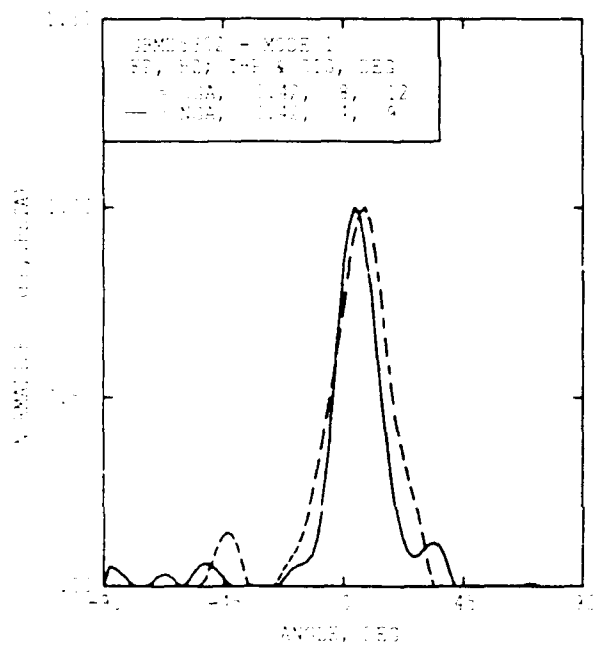


C) OGA VS. NGA DIRECTIVITY & PEAK FREQ  
GAGE CODE = C

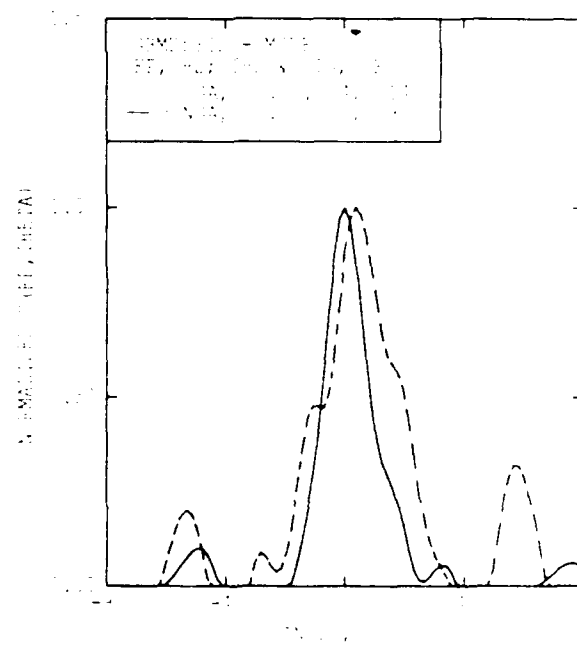




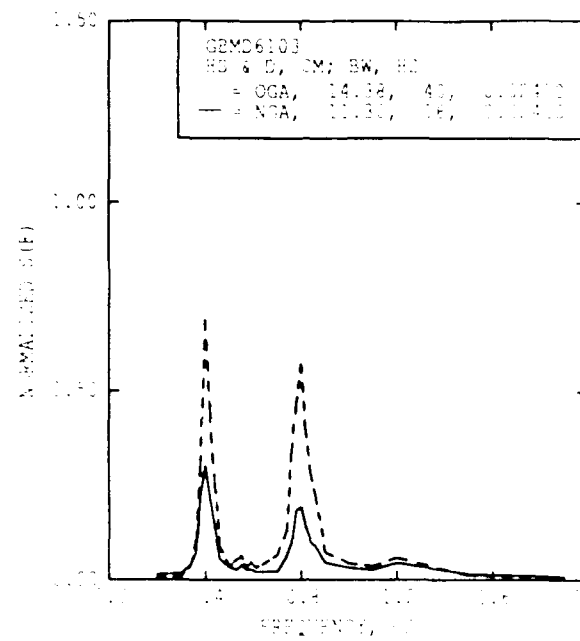
A. OGA VS. NGA FREQUENCY TO OGA  
PAGE 118 - A



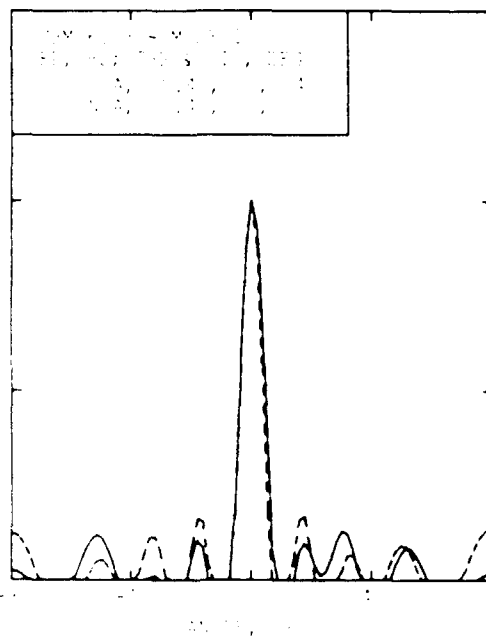
B. OGA VS. NGA (READING) 4 DEGREE FREQ  
PAGE 119 - A



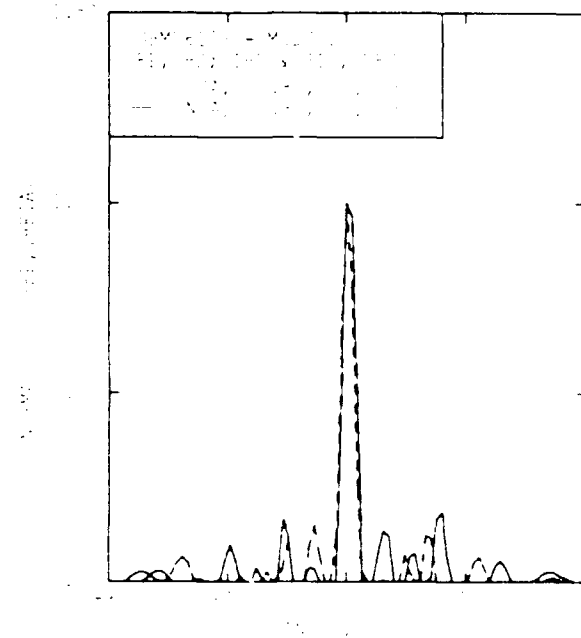
C. OGA VS. NGA (READING) 4 DEGREE FREQ  
PAGE 120 - A



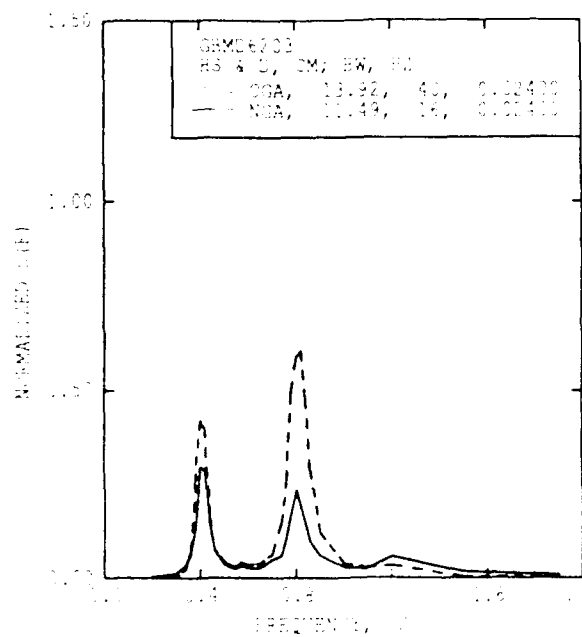
A. A V. NGA FREQUENCY REDUCTION  
 (RS = 5 D)



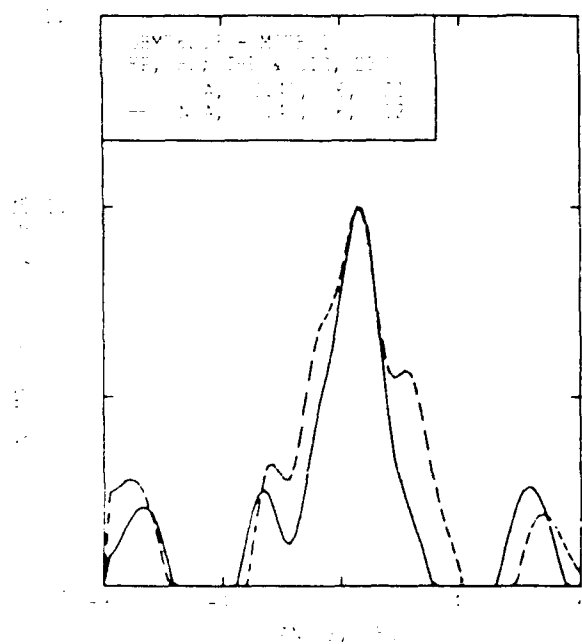
A. A V. NGA FREQUENCY REDUCTION  
 (RS = 5 D)



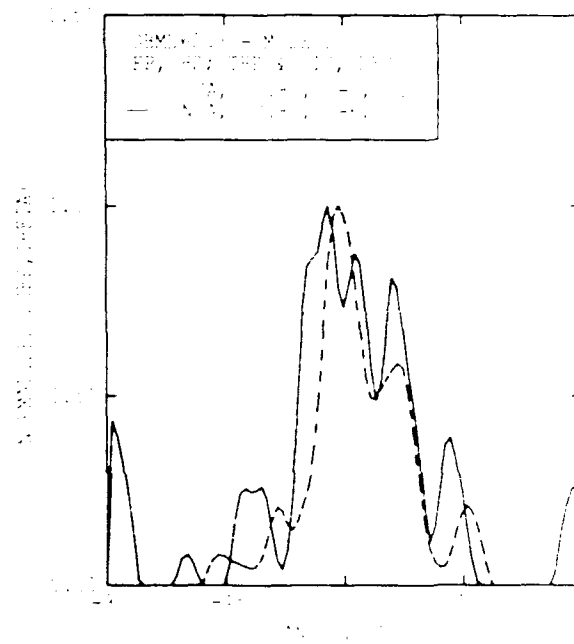
A. A V. NGA FREQUENCY REDUCTION  
 (RS = 5 D)



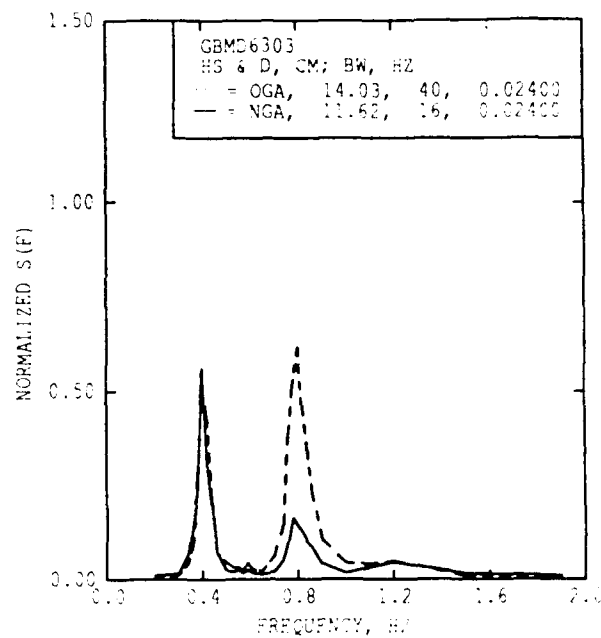
A. OGA vs. NSA FREQUENCY OF TBA  
AND TBA



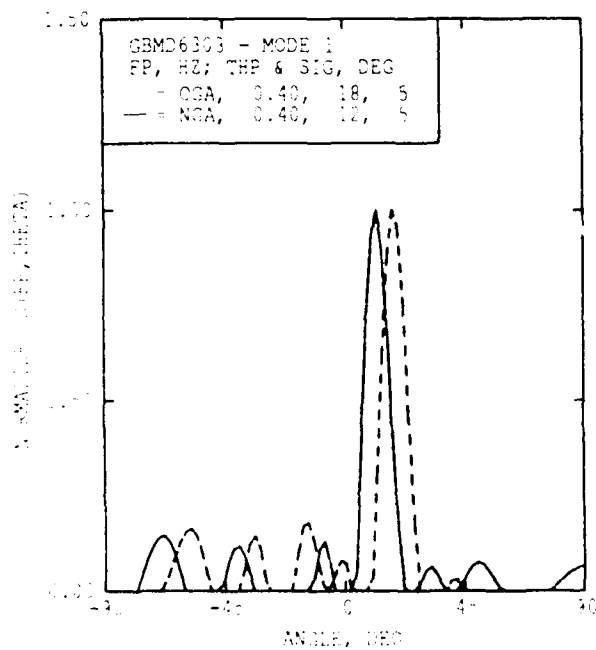
B. OGA vs. NSA FREQUENCY OF TBA



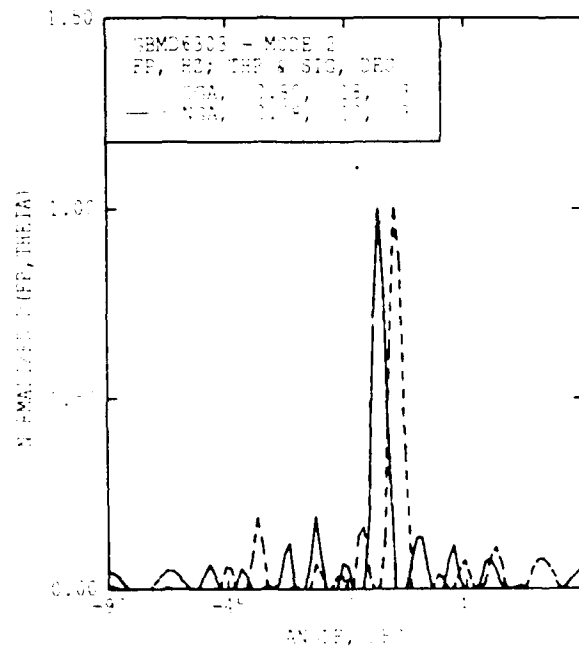
C. OGA vs. NSA FREQUENCY OF TBA



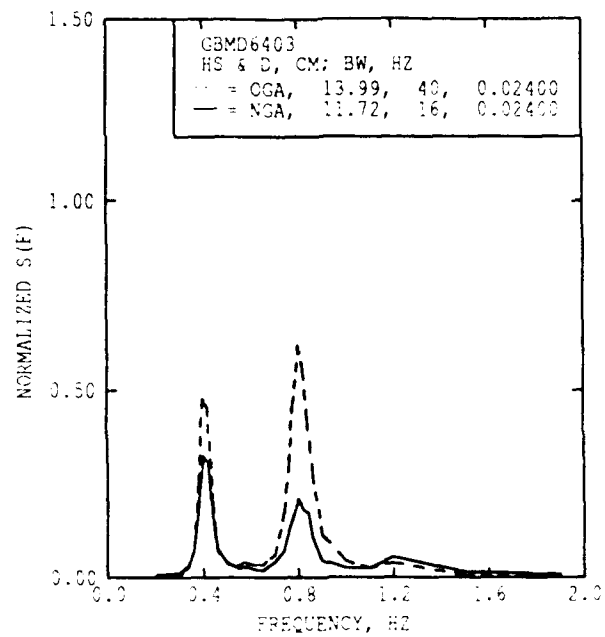
A) OGA VS. NGA FREQUENCY SPECTRA  
DATA CODE = B



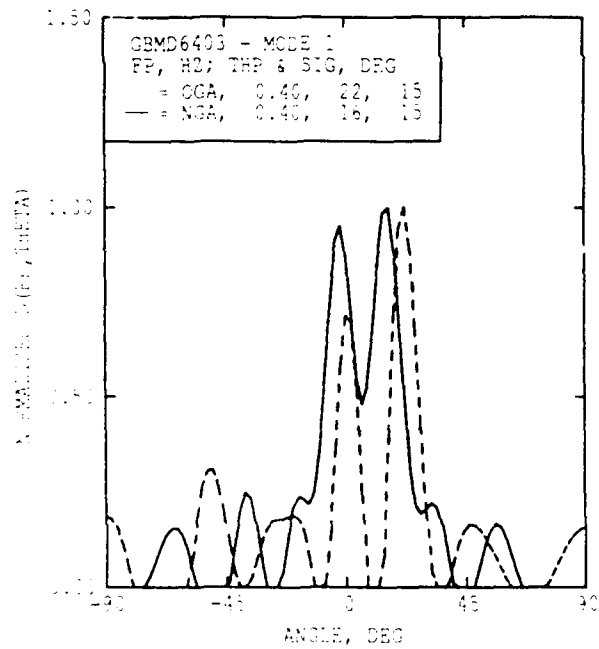
B) OGA VS. NGA DIRECTIVITY & BEAM PATTERN  
DATA CODE = B



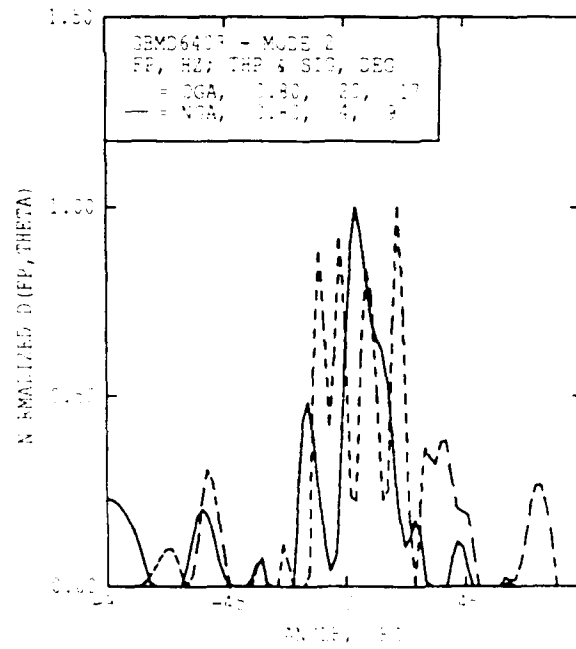
C) OGA VS. NGA DIRECTIVITY & BEAM PATTERN  
DATA CODE = B



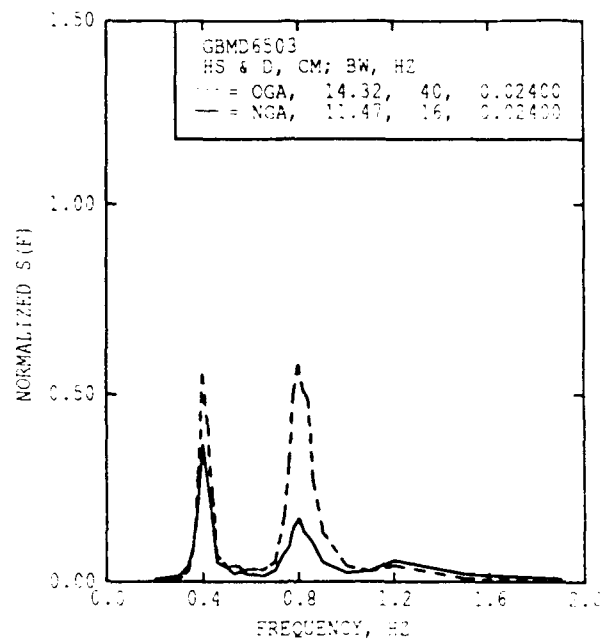
A) OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE = 8



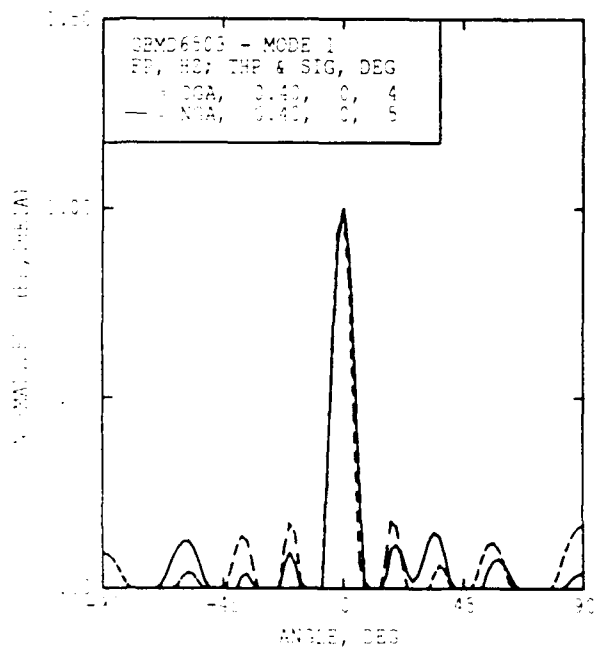
B) OGA VS. NGA DIRECTIVITY & PEAK FREQ  
GAGE CODE = 8



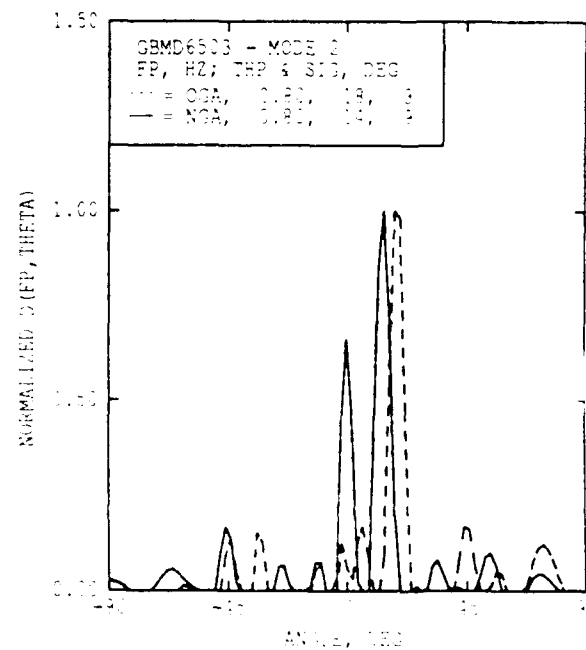
C) OGA VS. NGA DIRECTIVITY & PEAK FREQ  
GAGE CODE = 8



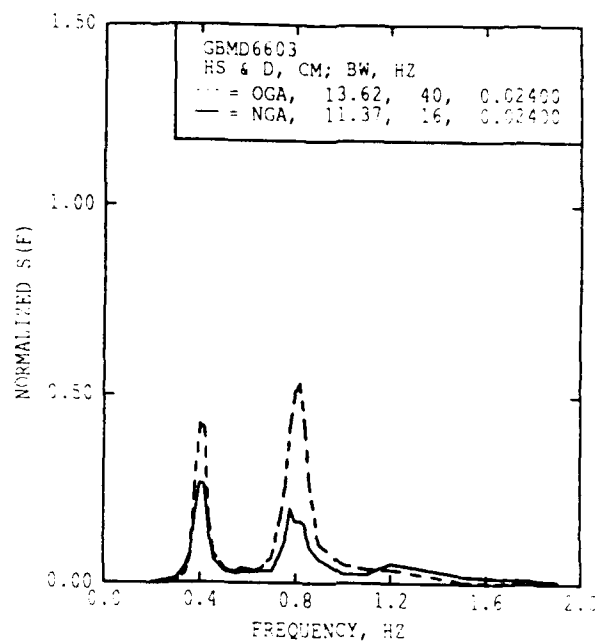
A) OGA VS. NGA FREQUENCY SPECTRA  
PAGE CODE = B



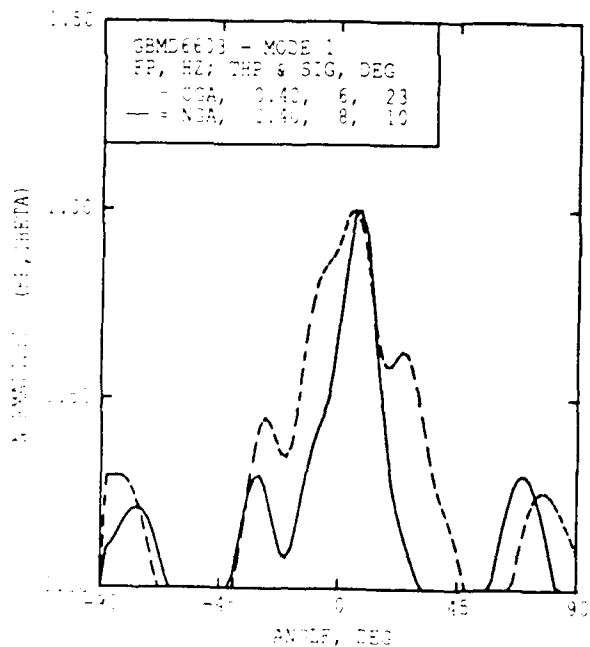
B) OGA VS. NGA DEGRADING 8 PEAK FREQ  
PAGE CODE = C



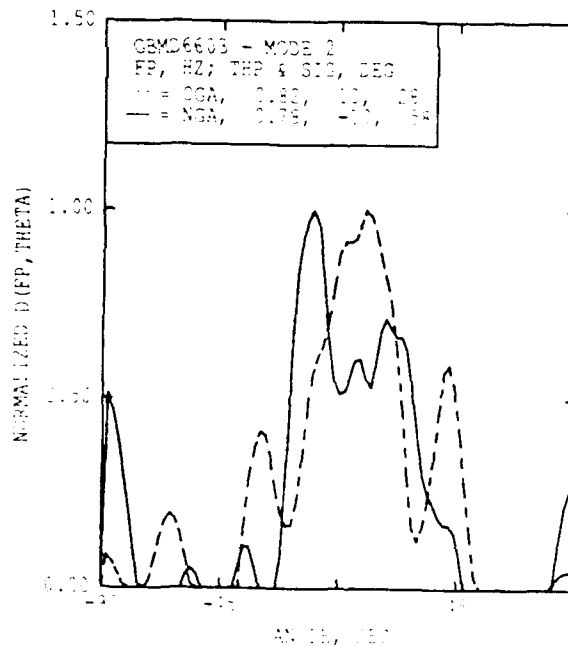
C) OGA VS. NGA DEGRADING 4 PEAK FREQ  
PAGE CODE = D



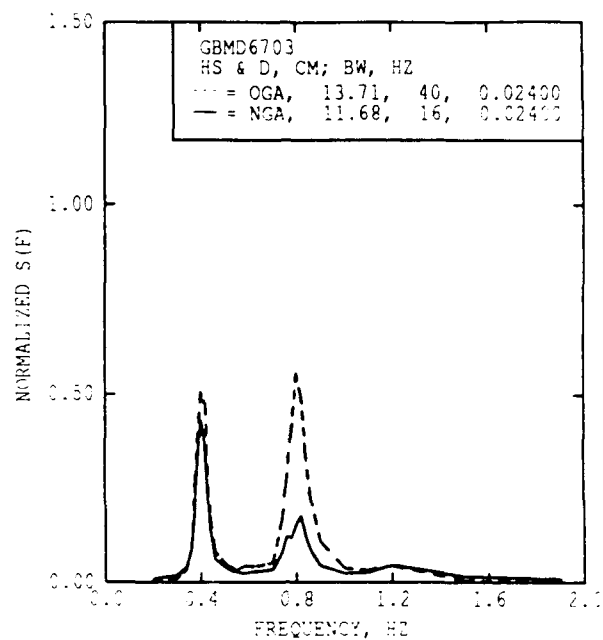
A) OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE = C



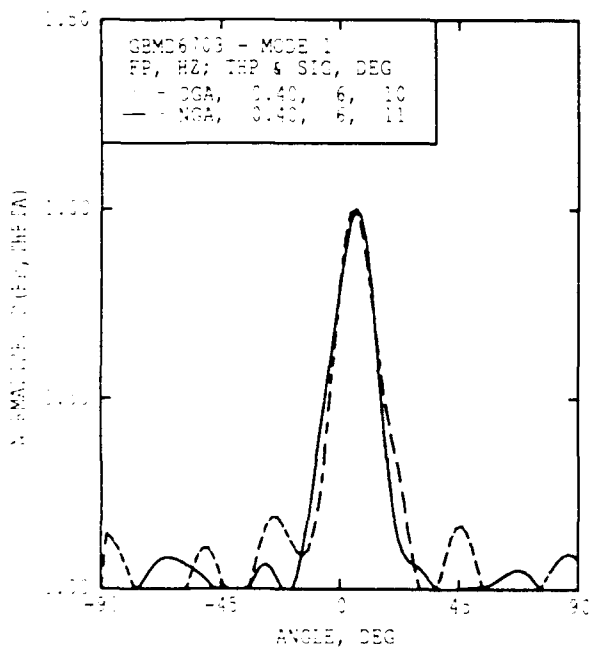
B) OGA VS. NGA DIRECTIVITY @ PEAK FREQ;  
GAGE CODE = C



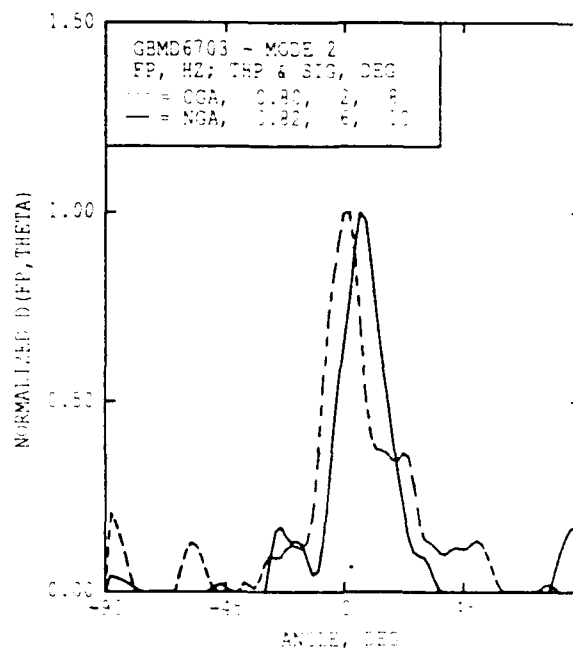
C) OGA VS. NGA DIRECTIVITY @ PEAK FREQ;  
GAGE CODE = C



A) OGA VS. NGA FREQUENCY SPECTRA  
PAGE CODE = A

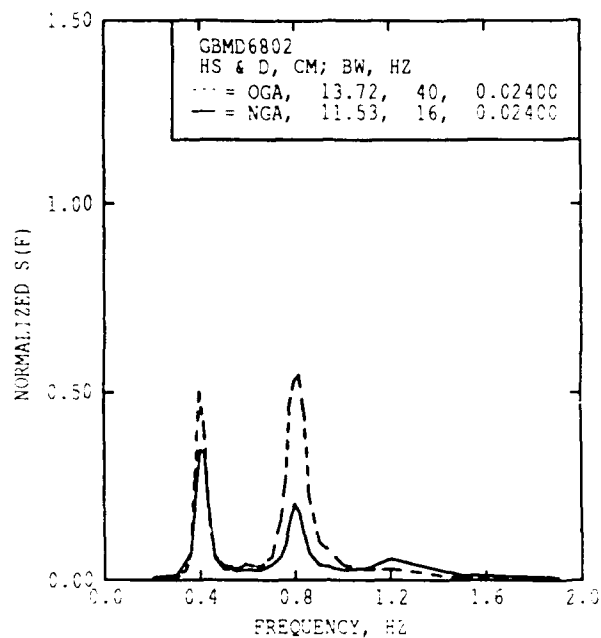


B) OGA VS. NGA SPREADING & PEAK PROFILE  
PAGE CODE = A

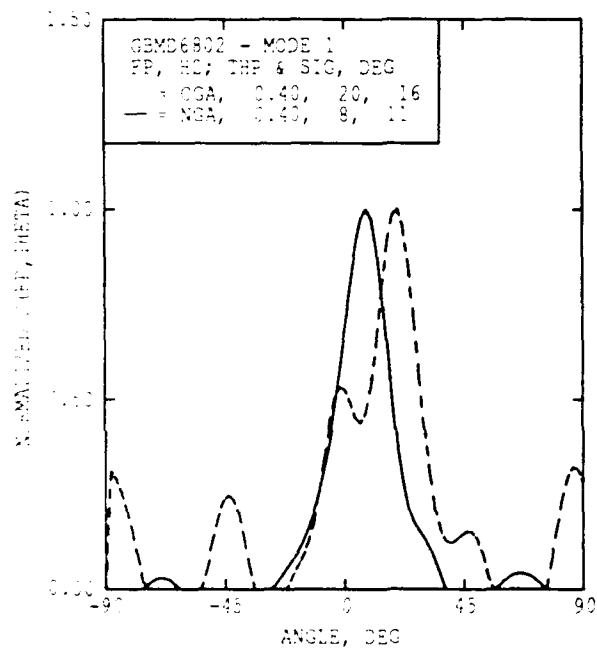


C) OGA VS. NGA SPREADING & PEAK PROFILE  
PAGE CODE = A

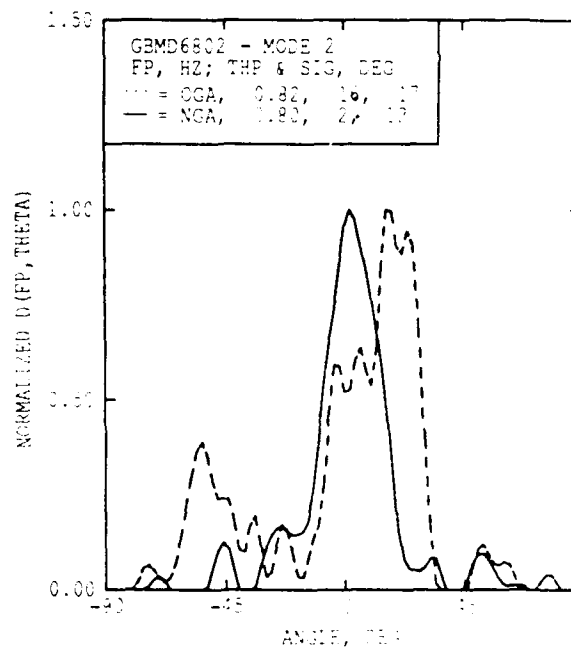




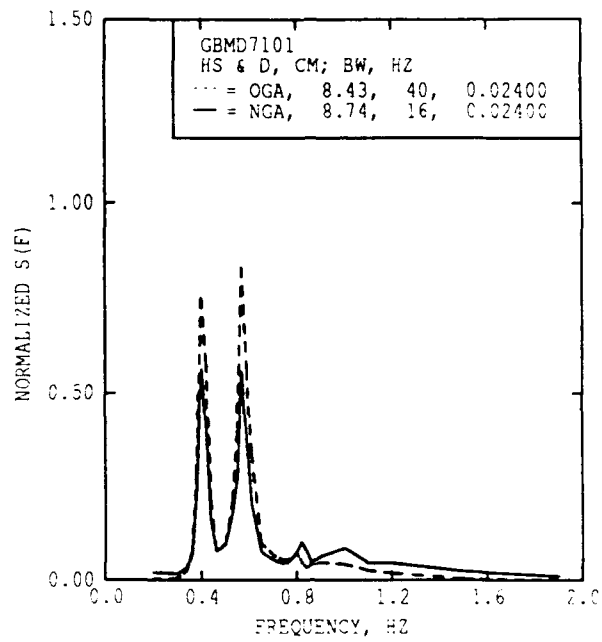
A) OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE = A



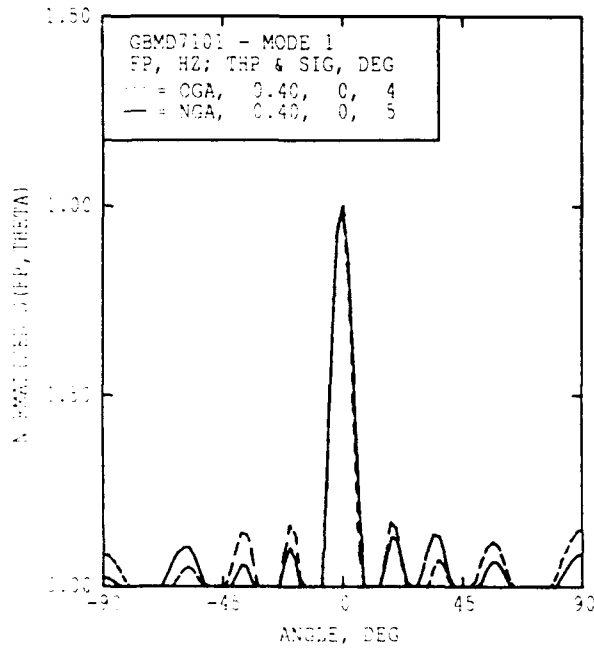
B) OGA VS. NGA SPREADING & PEAK FREQ  
GAGE CODE = A



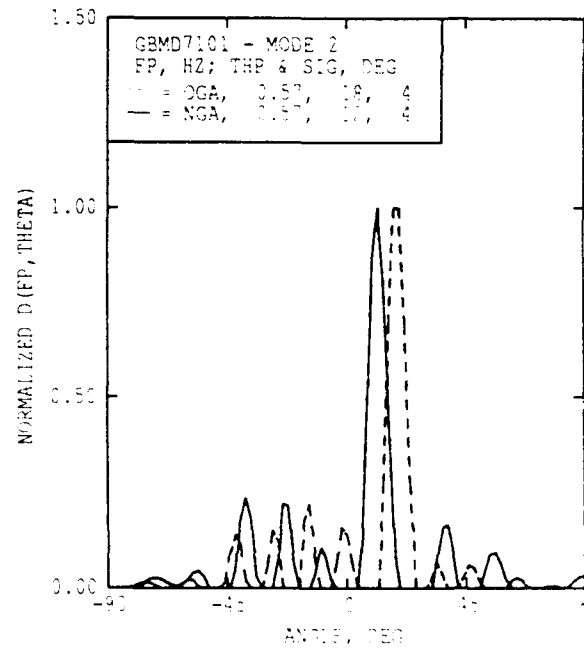
C) OGA VS. NGA SPREADING & PEAK FREQ  
GAGE CODE = A



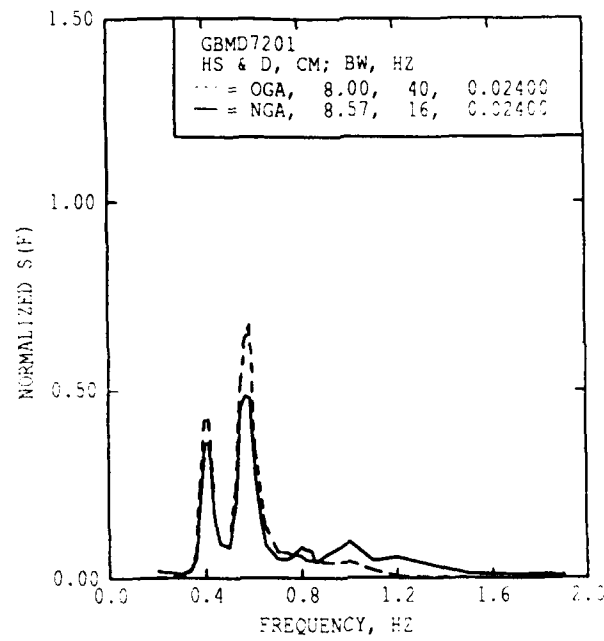
A) OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE = B



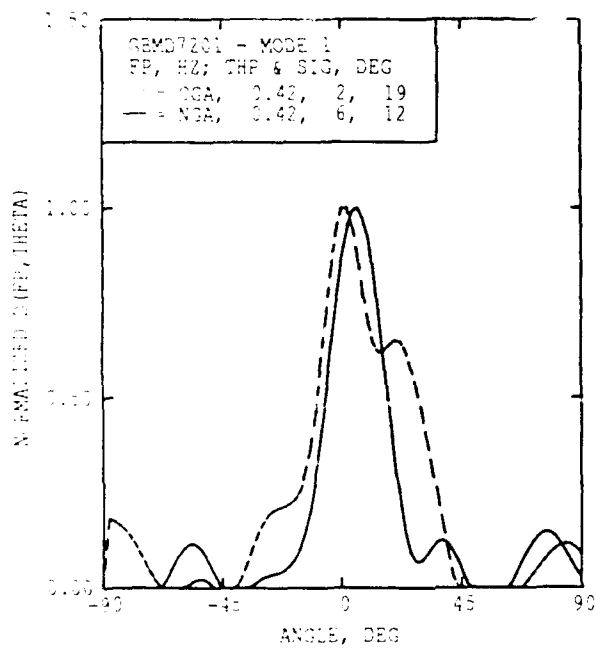
B) OGA VS. NGA SPREADING & PEAK FREQ  
GAGE CODE = B



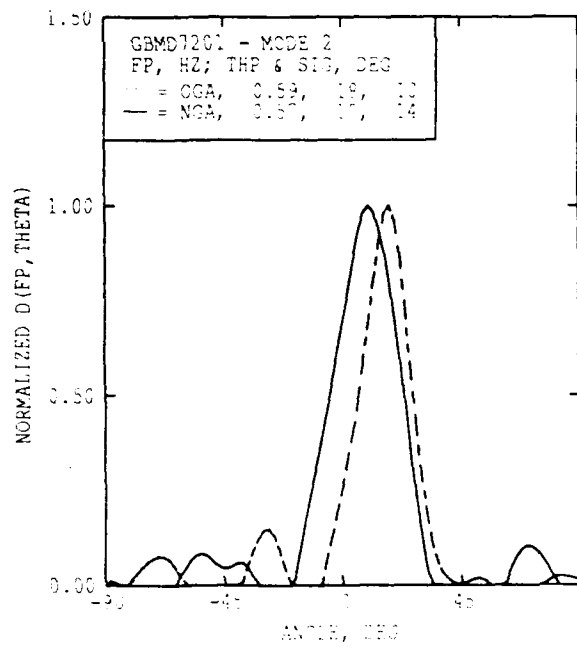
C) OGA VS. NGA SPREADING & PEAK FREQ  
GAGE CODE = B



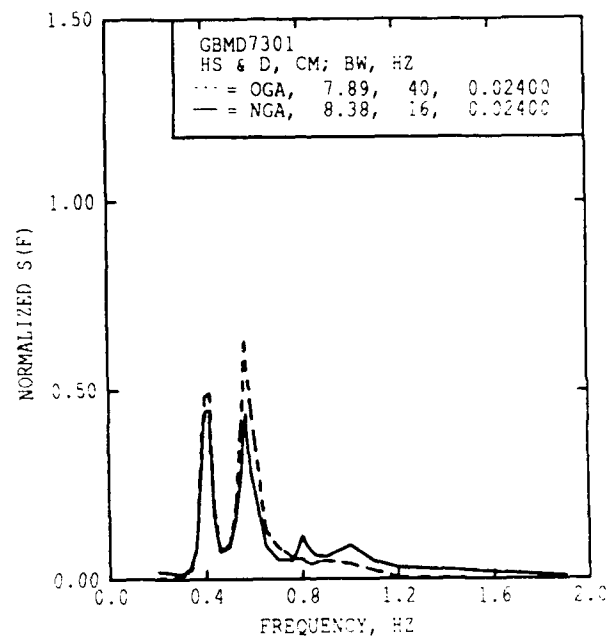
A) OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE = C



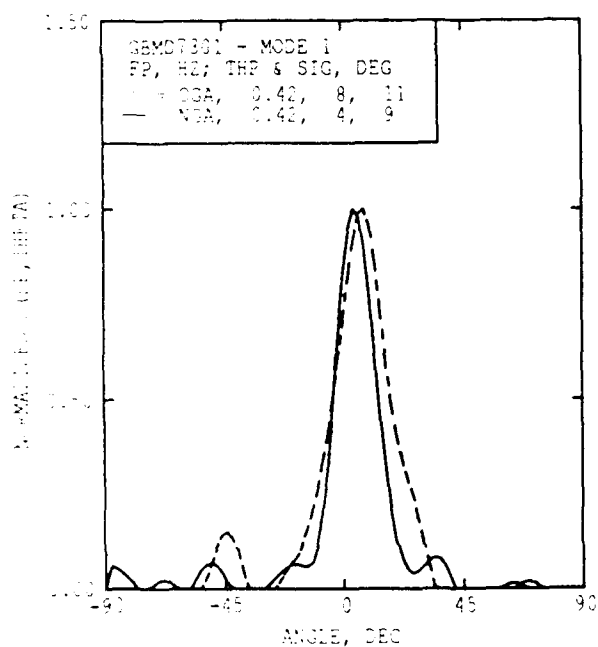
B) OGA VS. NGA SPREADING @ PEAK FREQ  
GAGE CODE = C



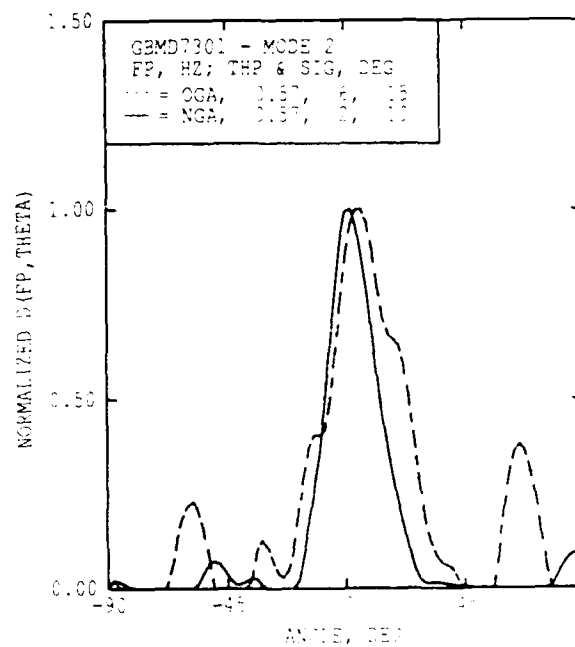
C) OGA VS. NGA SPREADING @ PEAK FREQ  
GAGE CODE = C



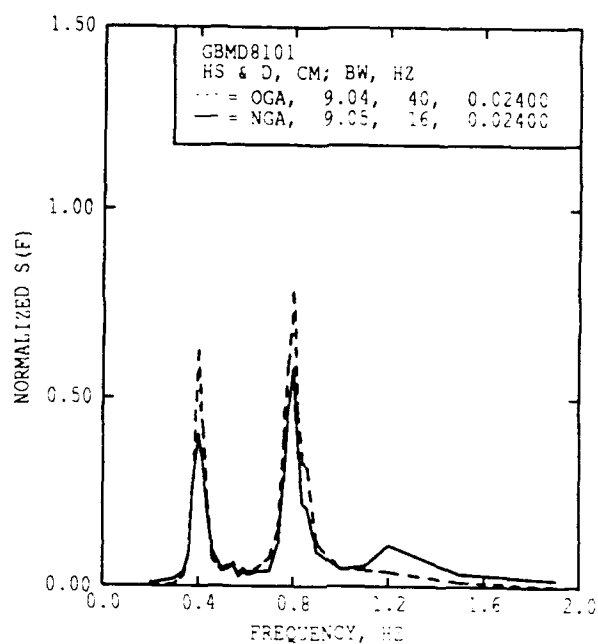
A) OGA VS. NGA FREQUENCY SPECTRA  
PAGE CODE = A



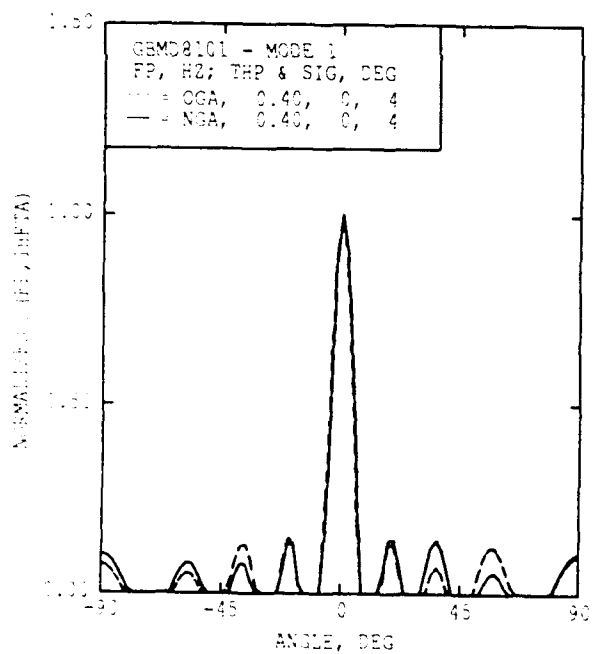
B) OGA VS. NGA SPREADING & PEAK FREQ  
PAGE CODE = A



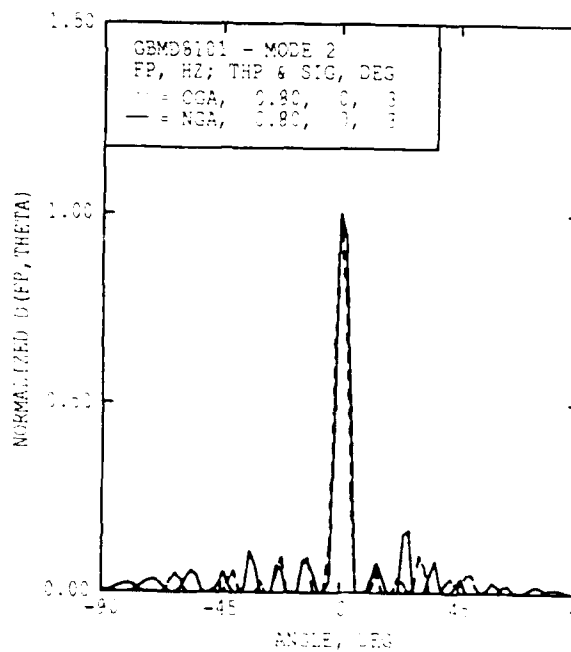
C) OGA VS. NGA SPREADING & PEAK FREQ  
PAGE CODE = A



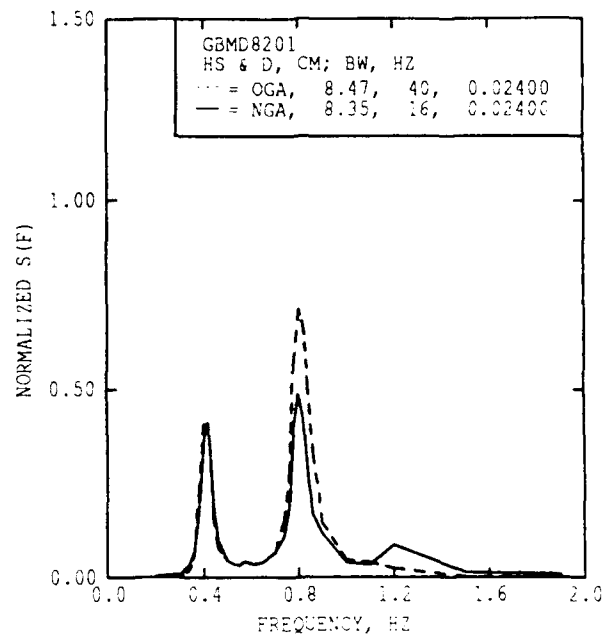
A) OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE = B



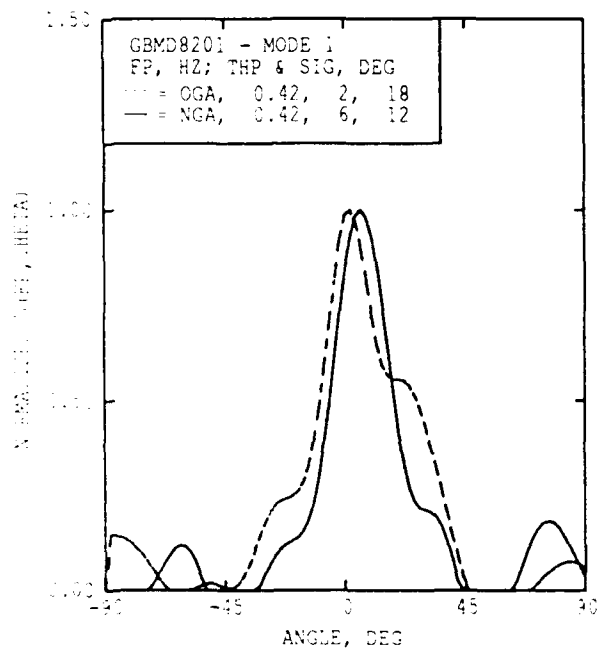
B) OGA VS. NGA SPREADING @ PEAK FREQ  
GAGE CODE = B



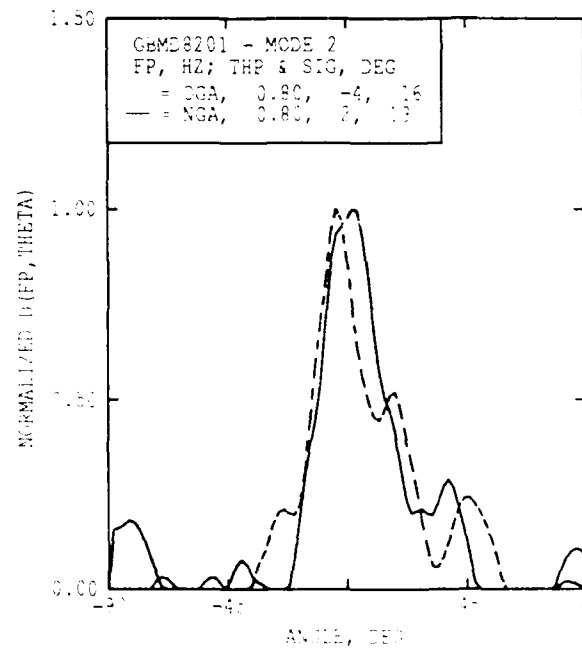
C) OGA VS. NGA SPREADING @ PEAK FREQ  
GAGE CODE = P



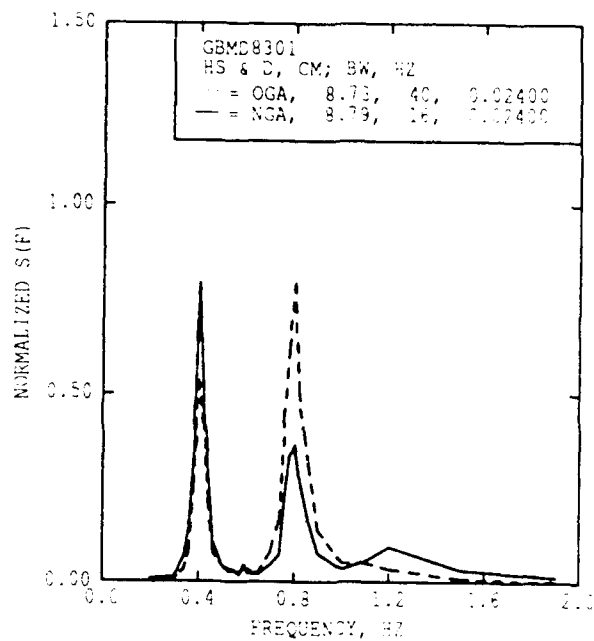
A) OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE = C



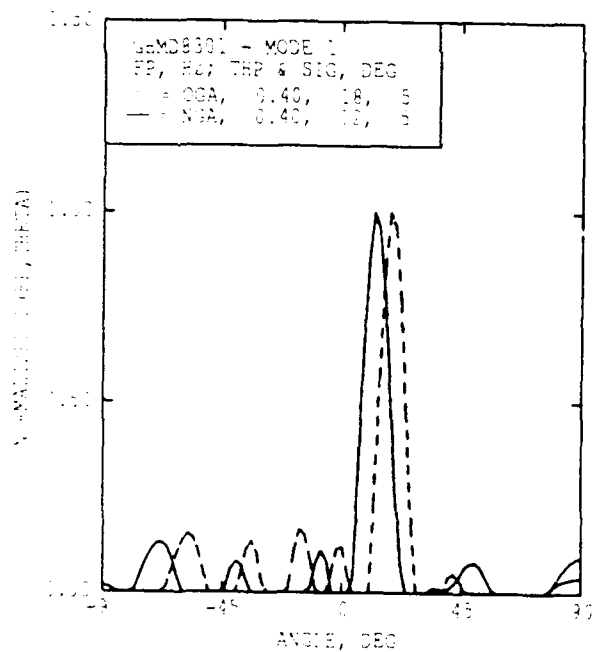
B) OGA VS. NGA SPREADING & PEAK FREQ  
GAGE CODE = C



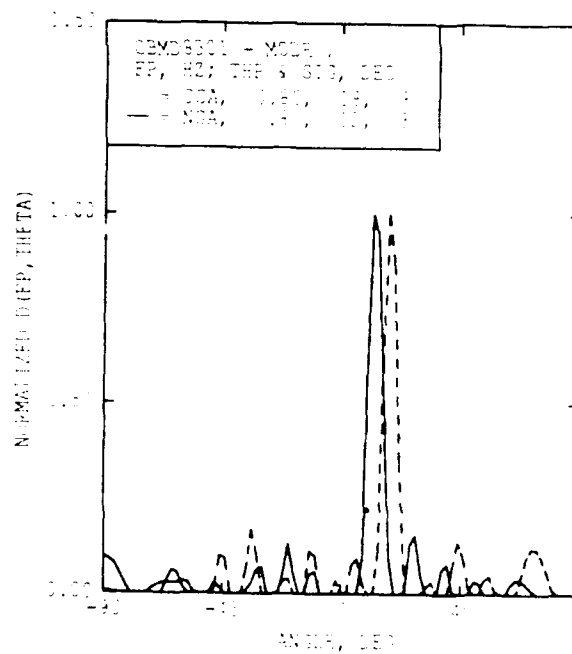
C) OGA VS. NGA SPREADING & PEAK FREQ  
GAGE CODE = C



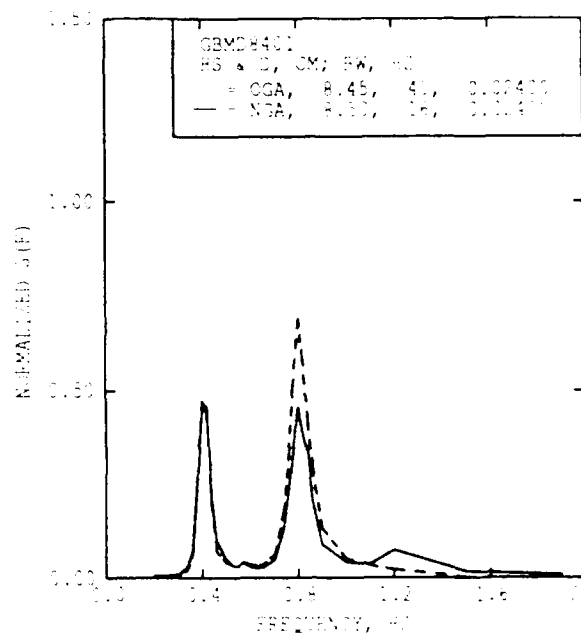
A) OGA VS. NGA FREQUENCY SPECTRA  
PAGE CODE = B



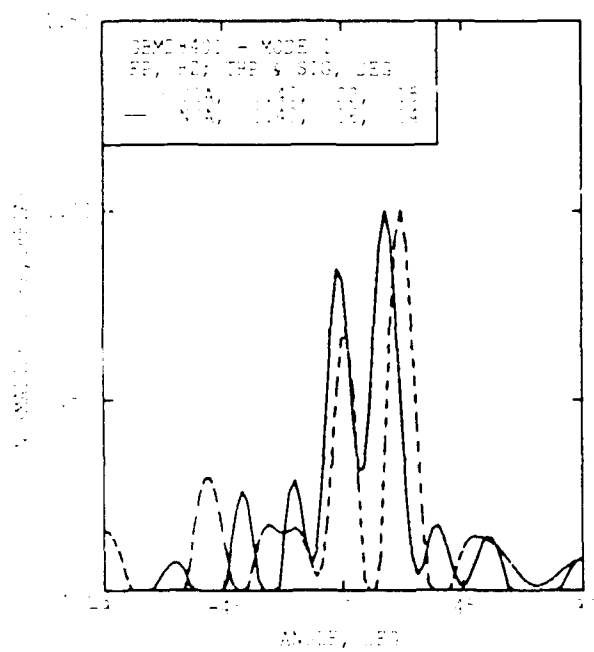
B) OGA VS. NGA SPREADING & PEAK FREQ  
PAGE CODE = C



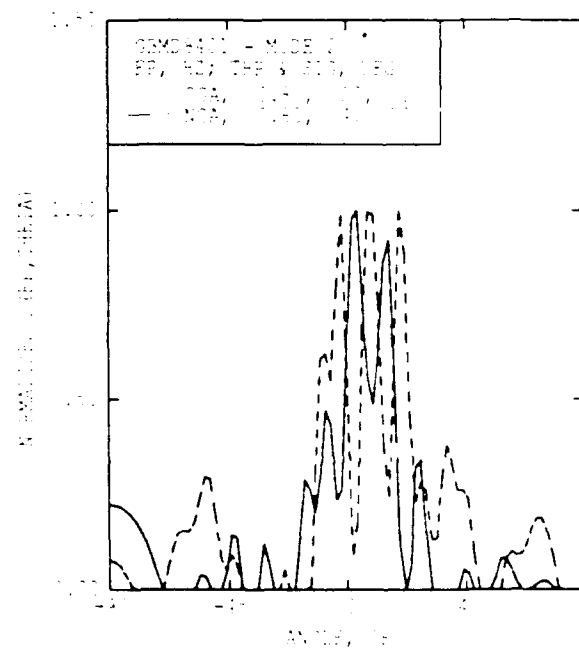
C) OGA VS. NGA SPREADING & PEAK FREQ  
PAGE CODE = D



A OGA VS. NGA FREQUENCY SPECTRA  
DATE 11/23/82

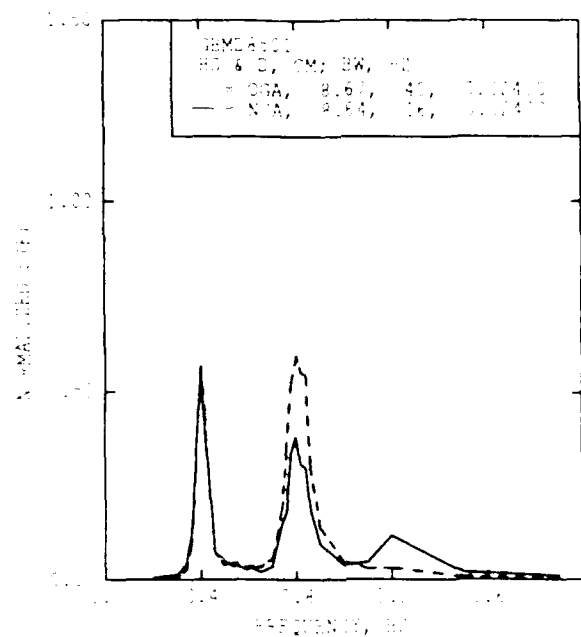


B OGA VS. NGA DISPLACEMENT vs. ANGLE  
DATE 11/23/82

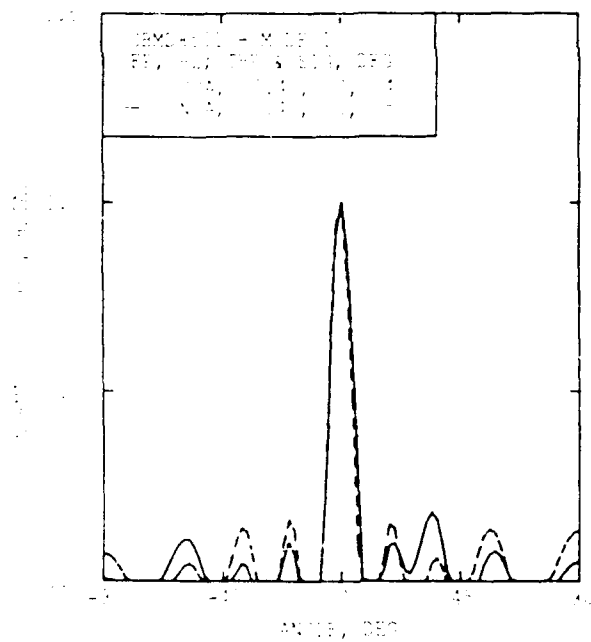


C OGA VS. NGA DISPLACEMENT vs. ANGLE  
DATE 11/23/82

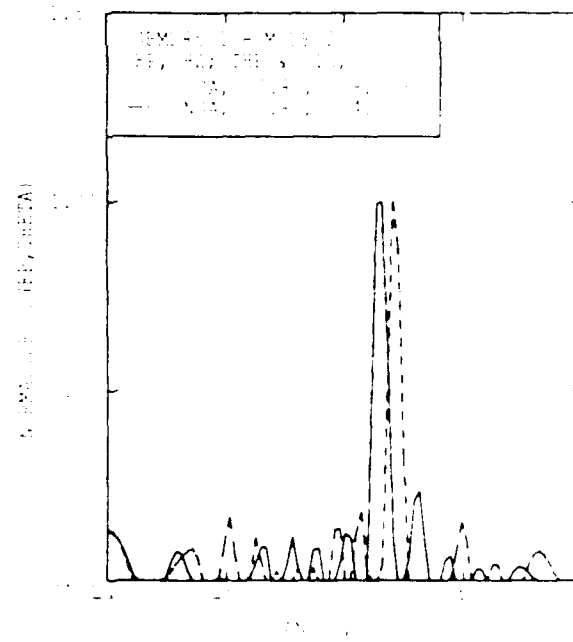




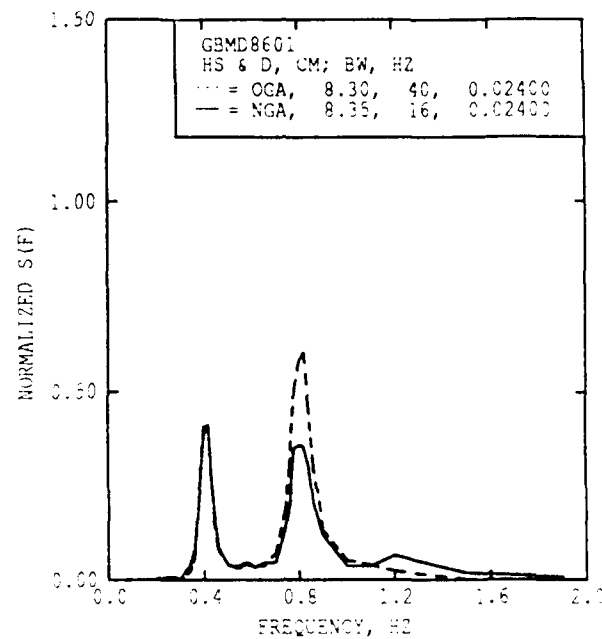
1. OPA vs. NPA FREQUENCY OFFSET  
 100 Hz



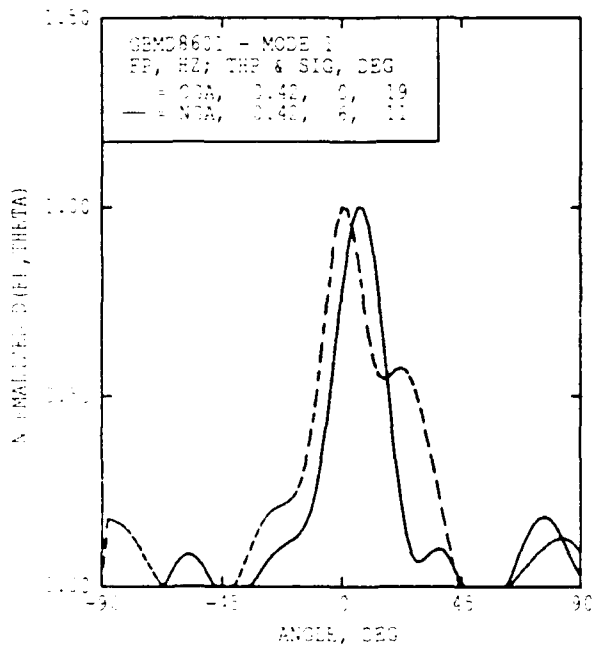
2. OPA vs. NPA FREQUENCY OFFSET  
 100 Hz



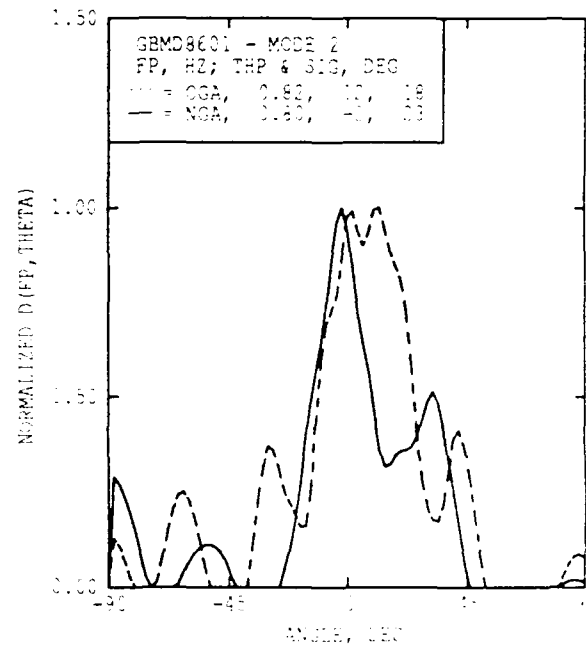
3. OPA vs. NPA FREQUENCY OFFSET  
 100 Hz



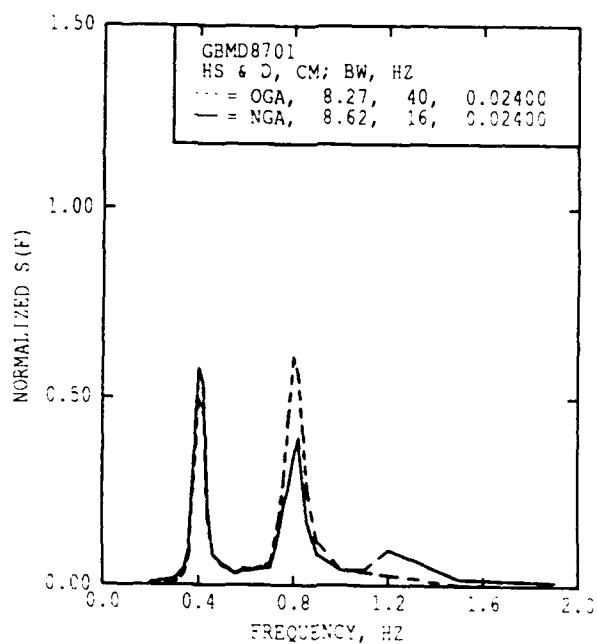
A) OGA VS. NGA FREQUENCY SPECTRA  
PAGE CODE = C



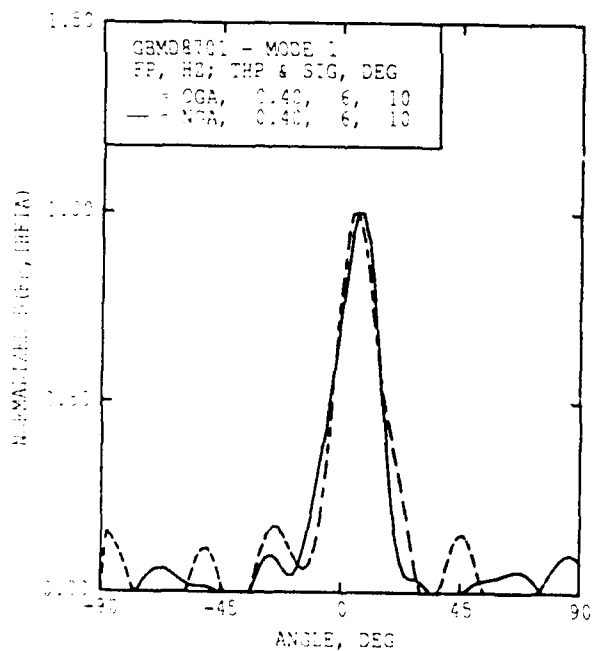
B) OGA VS. NGA SPREADING & PEAK FREQ.  
PAGE CODE = D



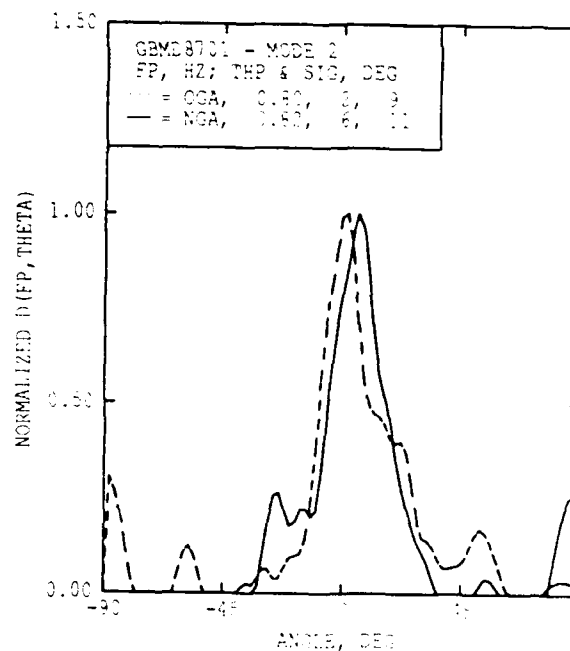
C) OGA VS. NGA SPREADING & PEAK FREQ.  
PAGE CODE = E



A) OGA VS. NGA FREQUENCY SPECTRA  
GAGE CODE = A



B) OGA VS. NGA SPREADING & PEAK FREQ  
GAGE CODE = A



C) OGA VS. NGA SPREADING & PEAK FREQ  
GAGE CODE = A