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STATIC WIND TUNNEL TESTS OF THE M823 RESEARCH STORE WITH SPLIT-SKIRT STABILIZERS

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ABSTRACT: The M823 configuration is an instrumented free fall store used in bomb research programs. This report presents the results of static wind tunnel tests for the basic forebody with split-skirt tail stabilizers attached.

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The purpose of this investigation was to obtain static stability data on the M823 research store with split-skirt stabilizers.

The authors wish to acknowledge the assistance rendered by Mrs. V. L. Schermerhorn in data acquisition and Messrs. M. Hardy and A. Comproni in report preparation.

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Captain, USN
Commander

K. R. ENKENHUS
By direction

CONTENTS

ILLUSTRATIONS

TABLES

INTRODUCTION

The Naval Ordnance Laboratory (NOL) has been engaged in a cooperative bomb research program with the British Royal Aircraft Establishment (RAE) and the Australian Weapons Research Establishment (WRE). This effort was undertaken, primarily, to ascertain the suitability of six-degree-of-freedom digital computer trajectory programs for predicting the flight path of free fall weapons. A study of this type became feasible when it was learned that the instrumented bomb research program of the WRE was being conducted. Subsequently, as a result of joint meetings among representatives of NOL, WRE and RAE, a mutual effort was agreed upon. NOL was to make the needed wind tunnel measurements and perform some of the trajectory computations. The United Kingdom Laboratories were to make available various instrumented bombs for the free fall portion of the study.

In addition to comparing the digital computer trajectory calculations with data obtained from the instrumented store program, it was decided to extend this effort to less conventional stabilizers. These stabilizers would include such devices as free-spinning cruciform tails, free-spinning monoplane tails and split-skirt tails. As its part in this effort, NOL will provide static and dynamic force and moment data on configurations formed by using the basic forebody with these various stabilizers attached to it.

A portion of the wind tunnel tests have been completed. Static force and moment measurements have been made for the fixed and free-spinning cruciform tails and for the free-spinning monoplane tails (see ref. (1)).

This report presents results of static wind tunnel measurements for the fixed split-skirt stabilizers (1.75 calibers in length and with skirt openings of 10 and 15 degrees). The advantage of this rather novel stabilizer lies in its ability to act as a variable (drag) retardation device. Drag data are not presented herein since previous examinations of both the stabilization and retardation properties of similar split skirts have been made.

SYMBOLS

A	reference area, $\pi d^2/4$
C_m	static pitching moment coefficient, M_y/QAd
C_N	normal force coefficient, F_N/QA
C_n	yawing moment coefficient, M_z/QAd
C_y	side force coefficient, F_y/QA
d	maximum body diameter
F_N	normal force (measured along z axis)
F_y	side force (measured along y axis)
M_y	pitching moment (measured about y axis)
M_z	yawing moment (measured about z axis)
Q	wind tunnel dynamic pressure
x, y, z	conventional body axes
α	angle of attack
δ	angle of skirt opening
ϕ	roll angle

DESCRIPTION OF BOMB CONFIGURATIONS

Table 1 lists the various configurations that are included in the test program. Each shape is designated symbolically by a letter. In this report static wind tunnel data are given for configurations C and E; these are fixed, split-skirt stabilizers with skirt openings of 10 and 15 degrees, respectively.

The wind tunnel model of the split-skirt configuration with the 15 degree skirt opening is illustrated in Figure 1. Since the forebody remains unchanged throughout the test program, only the skirt opening is changed (to 10 degrees) to form the second of the two split-skirt configurations tested.

The wind tunnel model used in this investigation is 0.1 scale. The model, with appropriate dimensions, is illustrated in Figure 2; and the base and sting geometry are shown in Figure 3.

In order to make measurements at the various roll angles desired, the tail was repositioned as follows. A retaining screw was released, the tail surfaces were rotated to the desired angle (in accordance with the definitions in Figure 4) and the assembly locked in place for the next test.

TEST TECHNIQUE

The wind tunnel tests were carried out in the NOL Supersonic Tunnel No. 1. This facility is a blowdown wind tunnel with an open jet in the test section. Relevant tunnel flow conditions are given in Table 2.

Force and moment data were obtained using a five-component internal strain-gage balance. The sting mount was fixed into a rotating sector arm so that an angle of attack traverse could be made for the test. After tunnel flow had been established, the model-sting combination was pitched at a rate of four degrees per second providing the angle of attack desired. The strain-gage signals were sampled (at 80 samples per second) and recorded on magnetic tape. The strain-gage signals were also used as an input to an analog coefficient computer (see ref. (3)). The output from this computer was used to drive the pen on an X-Y plotter, so that the data are recorded on line graphically as coefficients versus angle of attack. The signals were also recorded on magnetic tape for data reduction by digital computation.

DATA REDUCTION

As mentioned above, the strain-gage signal outputs were sampled and recorded on magnetic tape. The balance calibration and physical constants (such as dynamic pressure, reference lengths and areas, electrical gage center, moment reference center) were previously recorded on IBM cards. These cards were stored on magnetic tape in the computer. Using the calibration and data tapes as inputs, an IBM 7090 reduction program calculated the desired aerodynamic coefficients. This reduction procedure is described in reference (4). The output of the reduction program appeared

as a printed record of the coefficients - versus angle of attach - and as a plot tape. This tape was then used as the input to an EAI high-speed plotter which produced a graphical presentation of the coefficients versus angle of attack for each test condition.

For the data presentation in this report, the maximum body diameter was used as the reference length, and the maximum cross-sectional area was the reference area. The moment reference center for this investigation was the body mid-point (see Fig. 2).

DISCUSSION OF RESULTS

Table 1 lists all configurations in the free fall research program.

Figures 5 through 106 present the static data for configurations C and E. These data are the normal force coefficient, C_N, the pitching moment coefficient, C_m, the side force coefficient, C_y, and the yawing moment coefficient, C_n. The aerodynamic coefficients are plotted as functions of angle of attack with roll angle and Mach number as parameters. The rolling moment coefficient, C_ℓ, was measured but found to be insignificant, hence it is not included in the data presentation. In order to evaluate results of these tests, the static characteristics of both configurations will be discussed briefly.

The normal force and pitching moment coefficients for the C configuration are given in Figures 5 through 31. After examining these figures, it became apparent that the center of pressure is near the body mid-point for all test Mach numbers and roll angles. At small angles of attack (less than 10 degrees), there is a slight decrease in the static pitching moment coefficient when the model is roll positioned from 0 through 45.0 degrees. Generally, however, the configuration appears to be rather insensitive to roll angle (see for example Figs. 14, 15 and 16). It is interesting to note that a sudden increase in the static pitching moment coefficient slope occurs at an angle of attack of about 26 degrees, at 0 and 45.0 degrees of roll angle. However, for a roll angle

of 22.5 degrees there is only a gradual change in static pitching moment coefficient.

The normal force and pitching moment coefficients for the E configuration are given in Figures 32 to 55. These data indicate the same trends as noted above for the C configuration. The E configuration is somewhat more sensitive to roll angle than the C configuration (compare Figs. 41, 42 and 43 with Figs. 14, 15 and 16). These Figures also illustrate the sudden increase in static pitching moment coefficient at approximately α = 26 degrees, for roll angles of 0 and 45.0 degrees; and, the gradual change in this coefficient with angle of attack for a roll angle of 22.5 degrees.

The side force and yawing moment coefficients for the C configuration are given in Figures 56 to 82; and for the E configuration in Figures 83 to 106. Both stabilizers indicate an increase in side force and yawing moment coefficients above 22 degrees angle of attack, for a roll angle of 0 degrees (see for example Figs. 62 and 89). At a roll angle of 45.0 degrees, the C configuration has a steadly increasing yawing moment coefficient, for angles of attack as low as 4 degrees (see for example Figs. 61, 64 and 76). At a roll angle of 45.0 degrees the E configuration has a nearly constant yawing moment coefficient, until large angles of attack are reached - above 24 degrees - (see for example Figs. 88, 91 and 100). As expected, both configurations have their maximum side force and yawing moment coefficients at a roll angle of 22.5 degrees.

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(2) Regan, F. J., "The Aerodynamic Characteristics of an Ogive Cylinder with Split-Skirt Stabilizer at Subsonic, Transonic and Supersonic Speeds," NOLTR 63-86, Oct 1965

(3) Willis, J. W., "Analog Computer for the Evaluation of Aerodynamic Coefficients," NOLTR 64-74, Aug 1964

(4) Shantz, I., Gilbert, B., White, C., "NOL Wind Tunnel Internal Strain-Gage Balance System," NAVORD 2972, Sep 1953

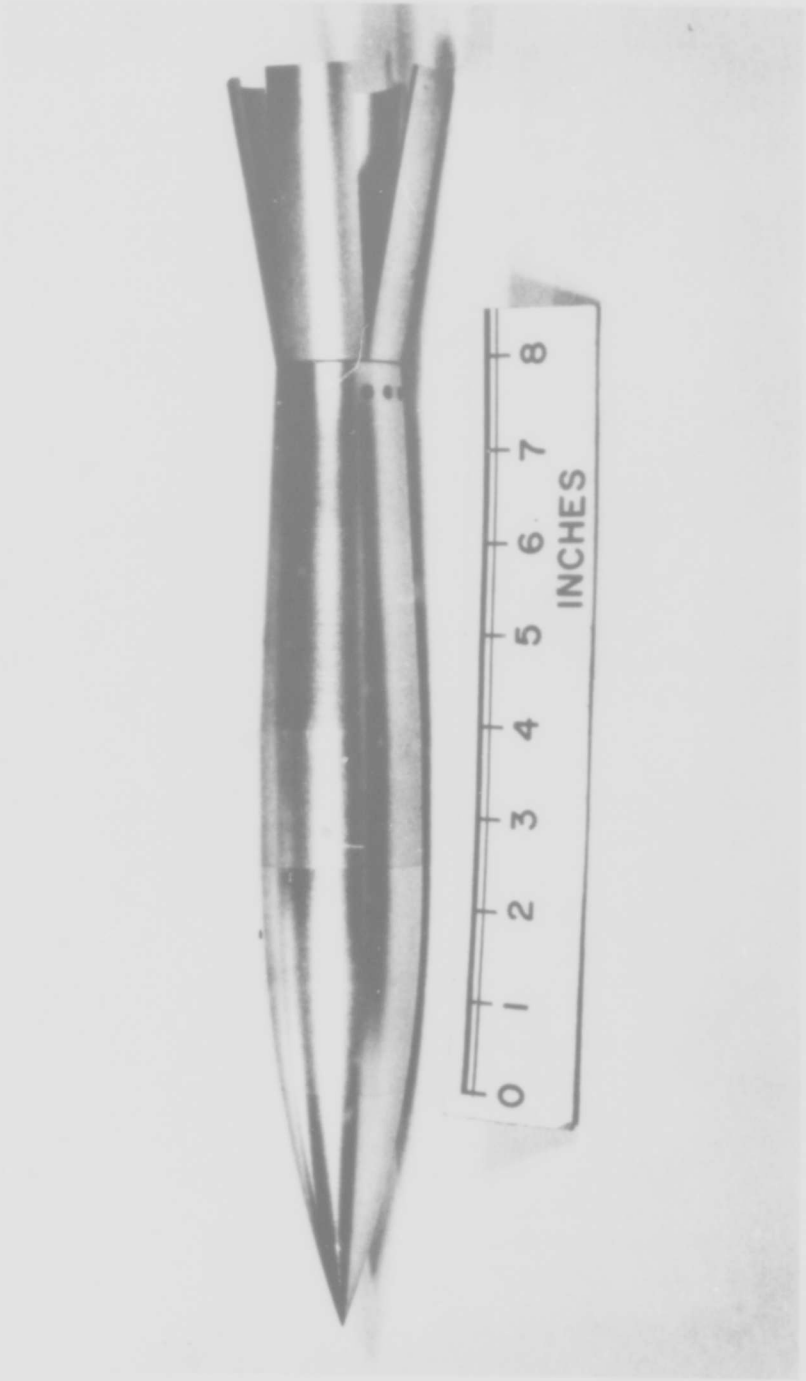


FIG. 1 WIND TUNNEL MODEL OF M823 RESEARCH STORE WITH SPLIT-SKIRT TAIL

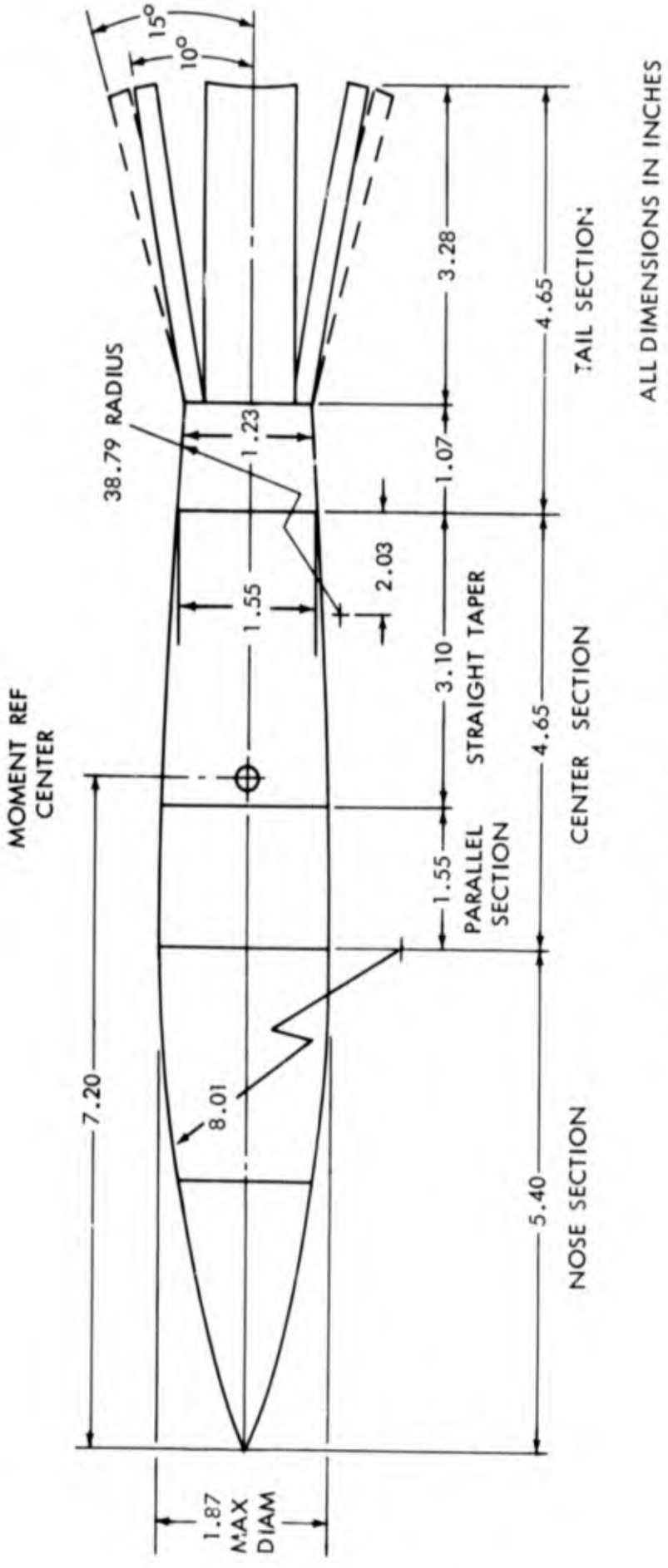


FIG. 2 M823 FREE FALL RESEARCH STORE

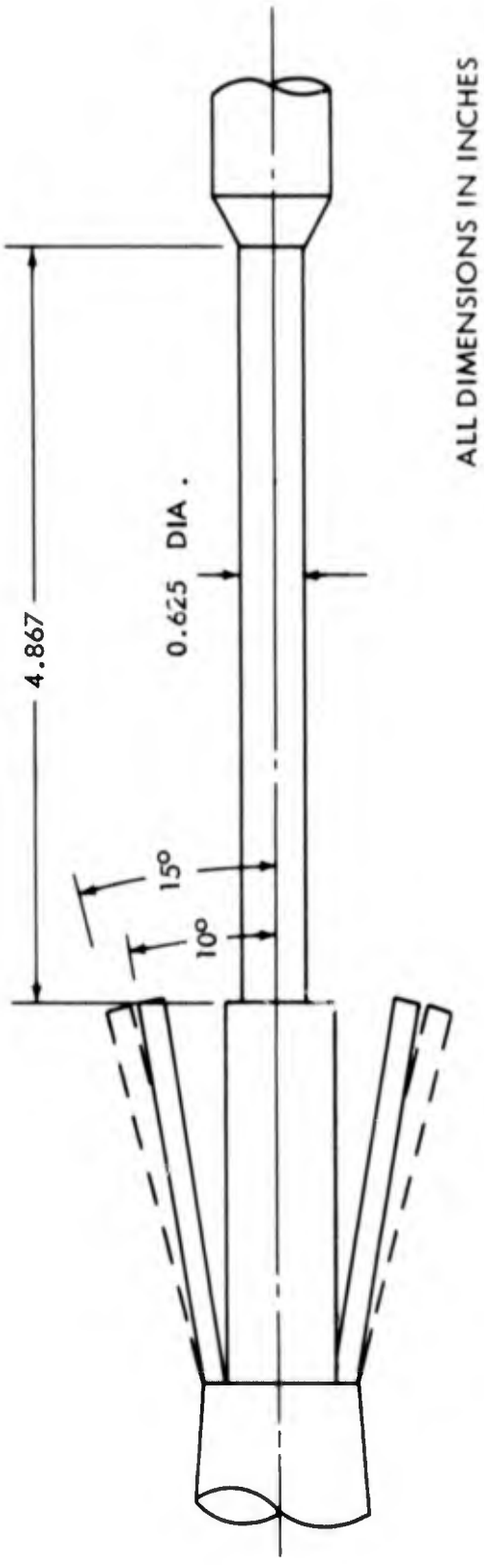
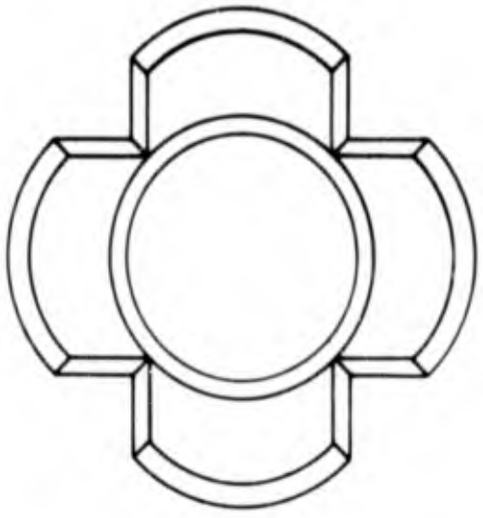
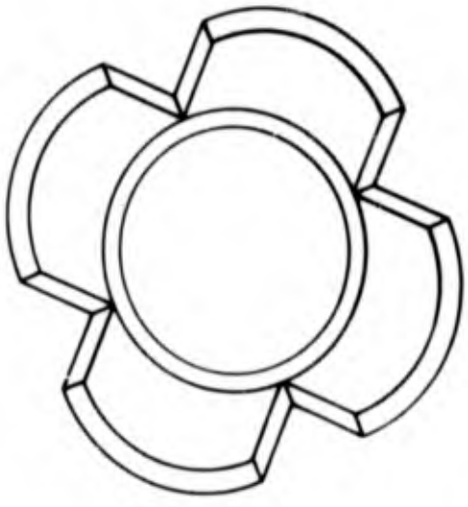


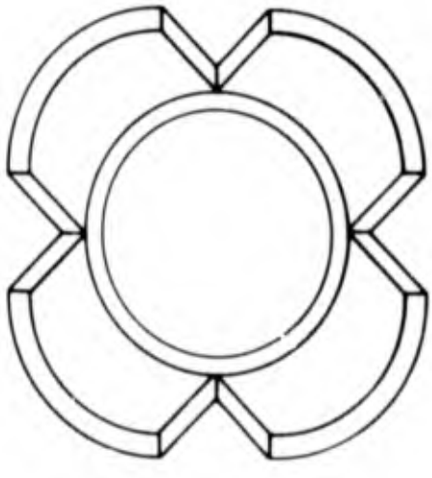
FIG. 3 STING GEOMETRY



$\phi = 0°$

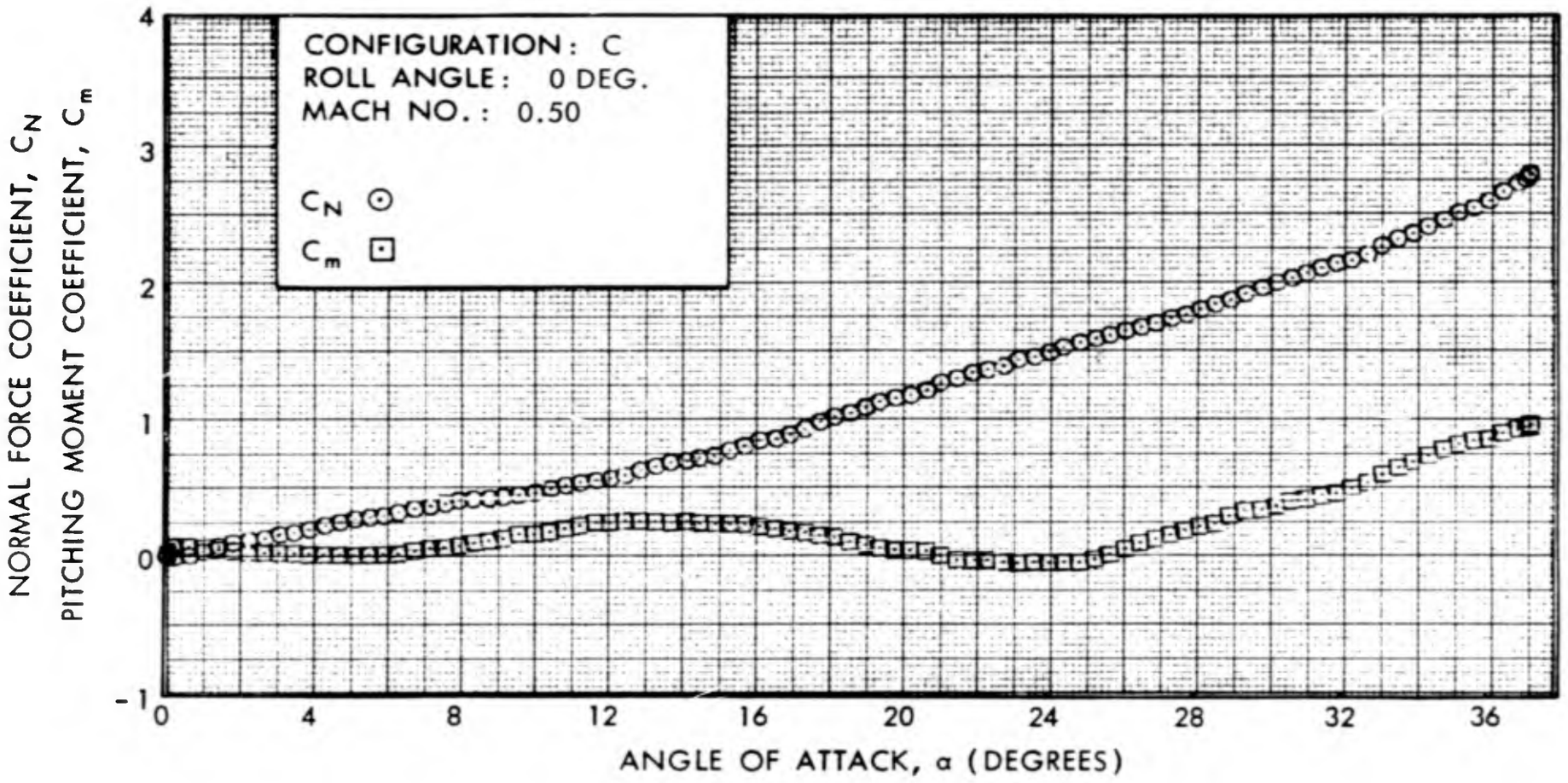


$\phi = 22.5°$



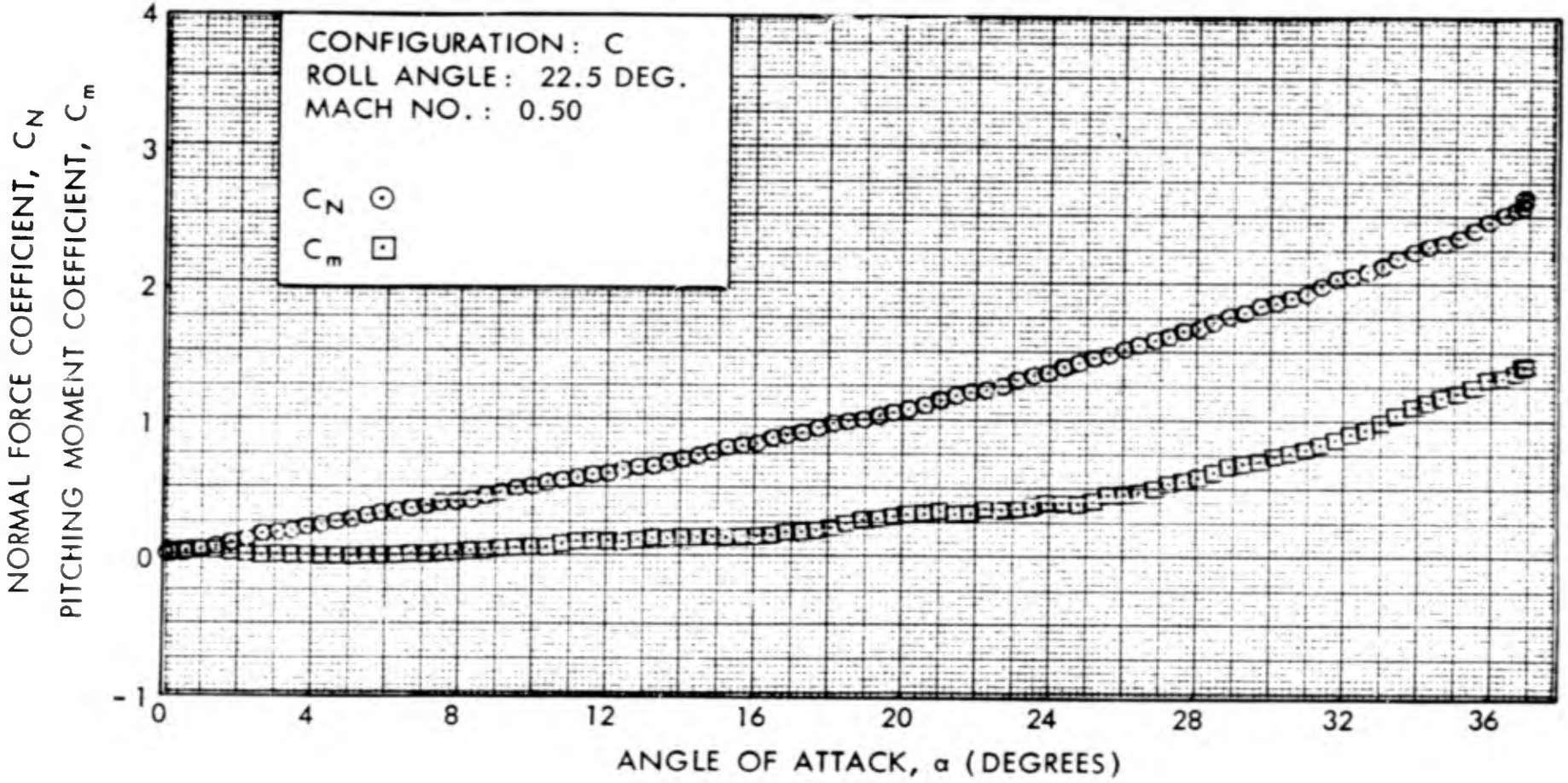
$\phi = 45°$

FIG. 4 DEFINITION OF ROLL ORIENTATION



NOLR 61-89

FIG. 5 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



NOLTR 61-89

FIG. 6 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

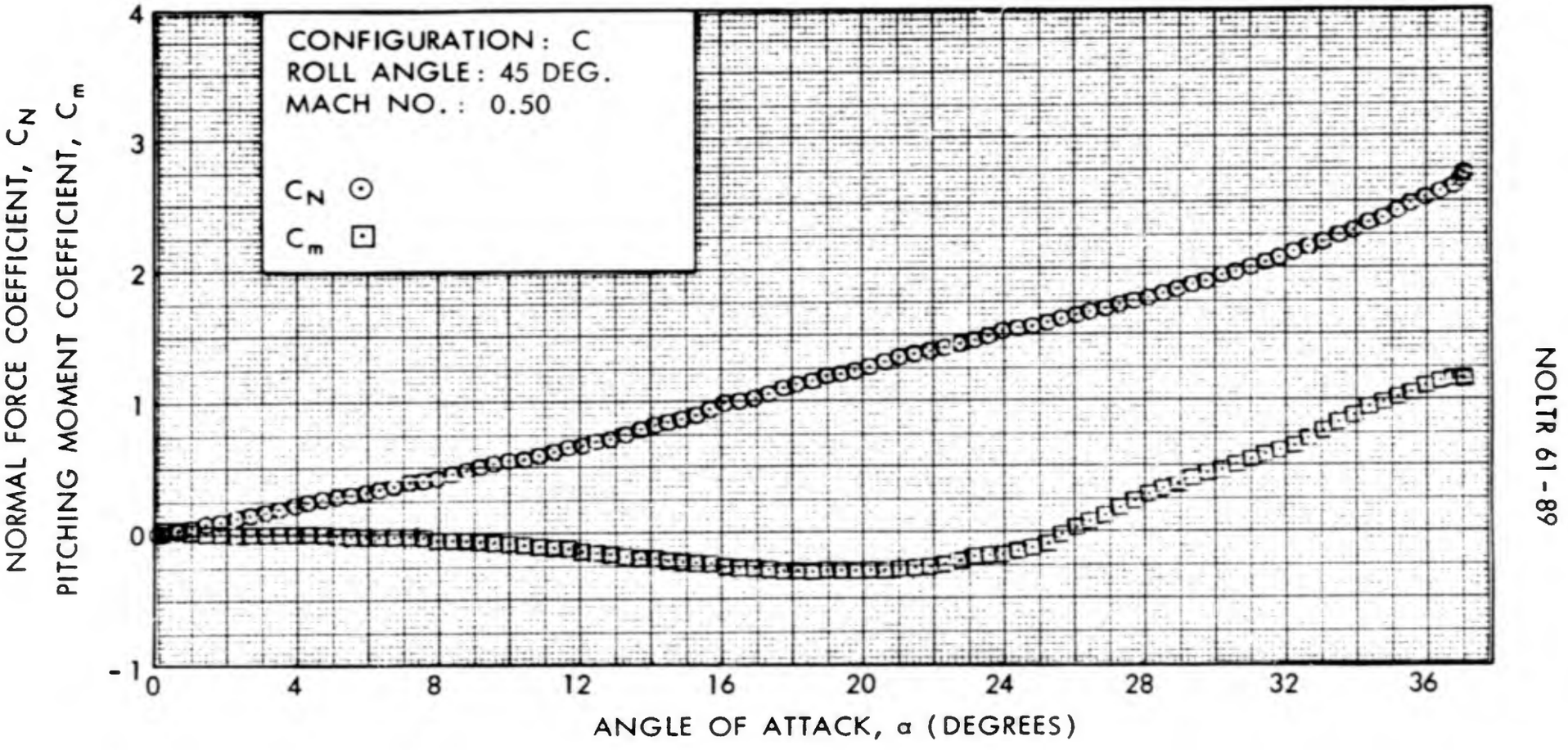
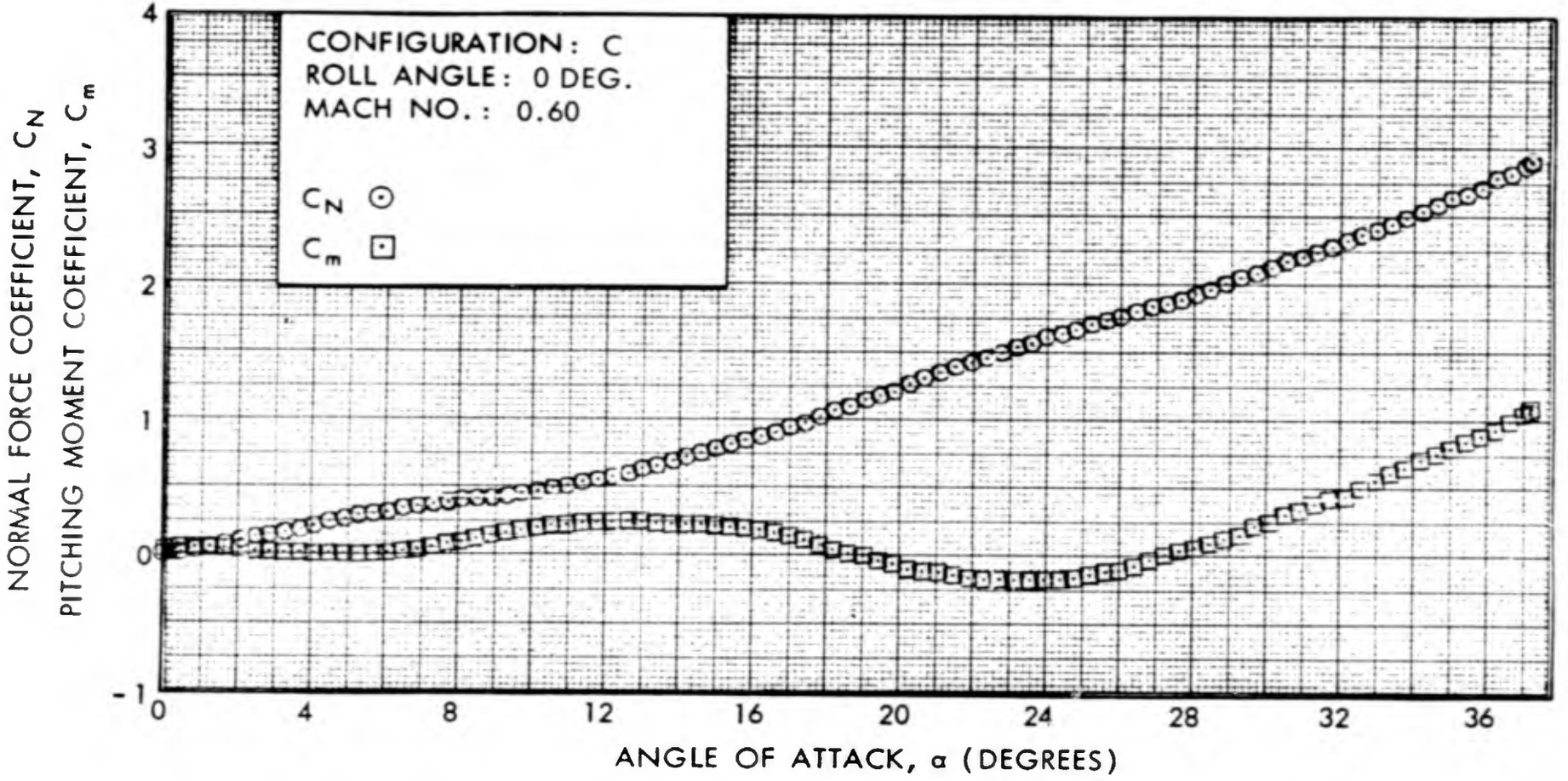
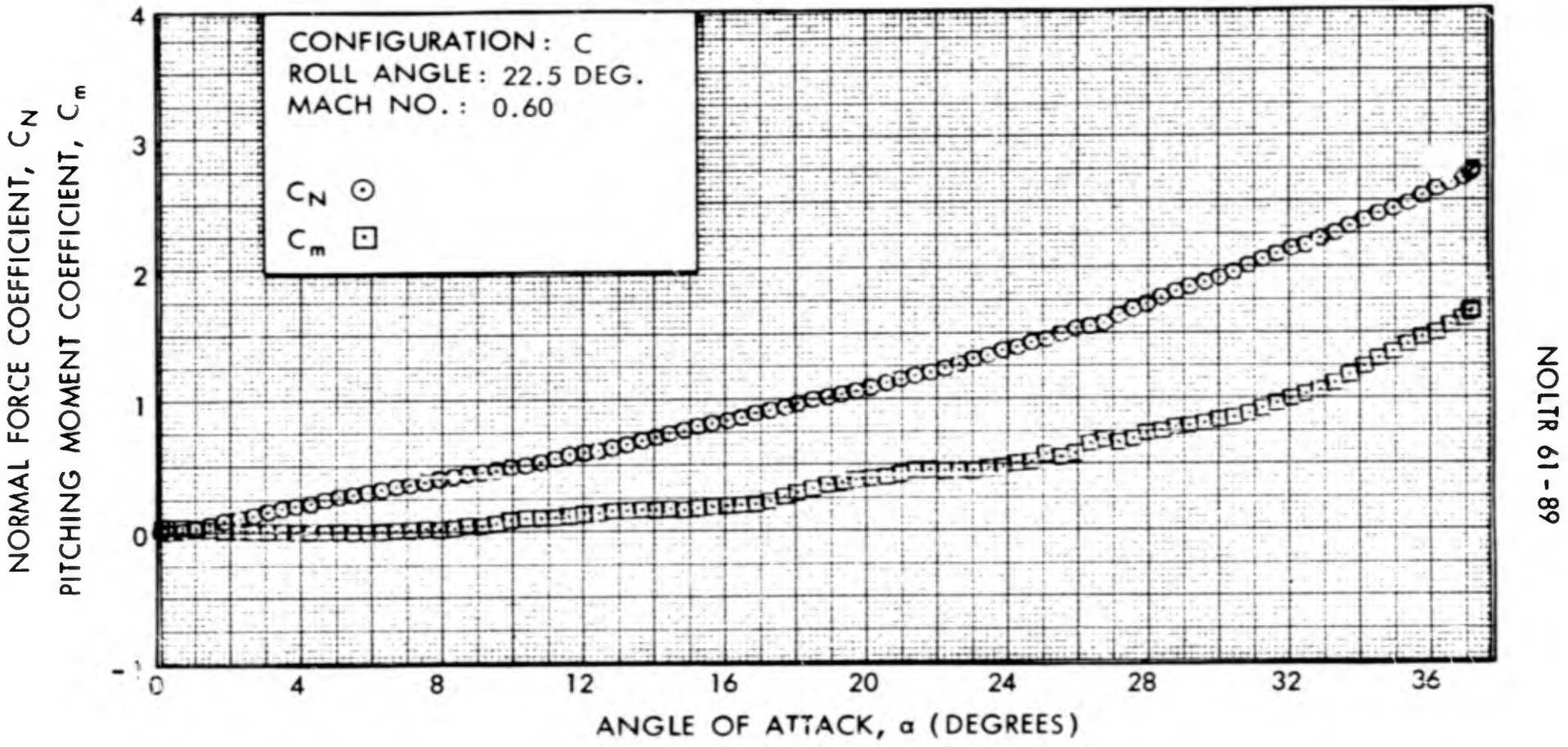


FIG. 7 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



NOLTR 61-89

FIG. 8 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



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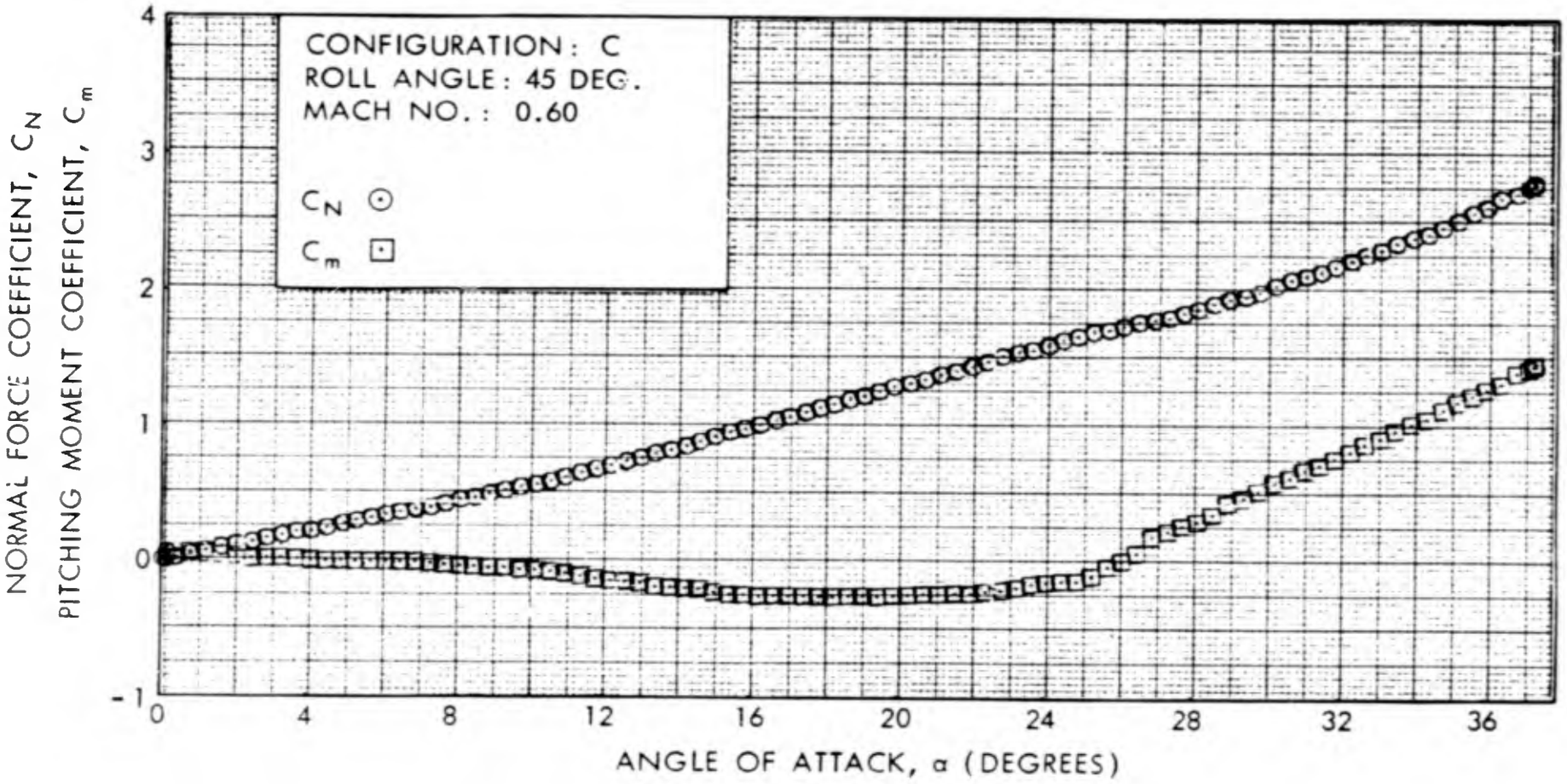
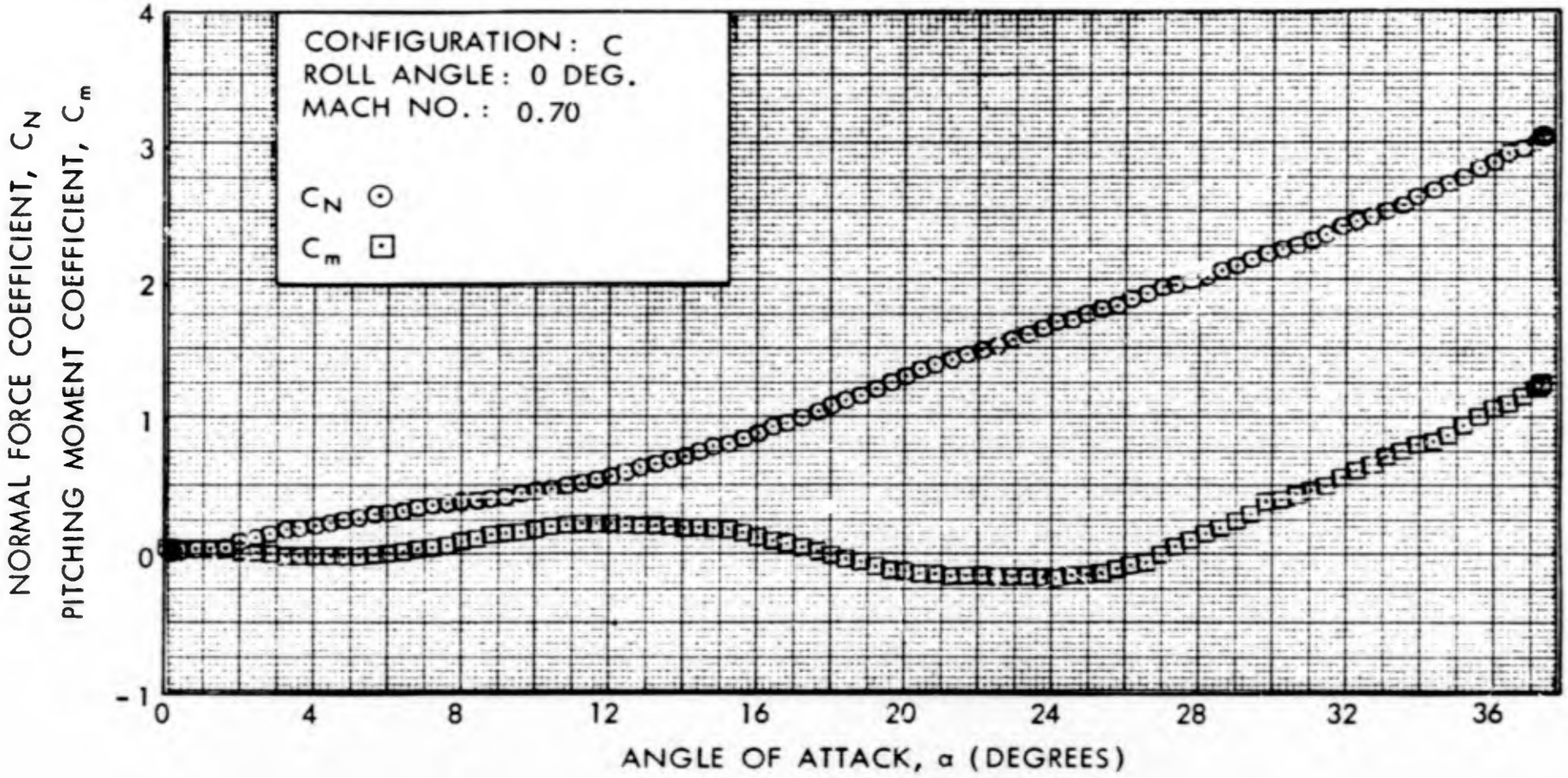


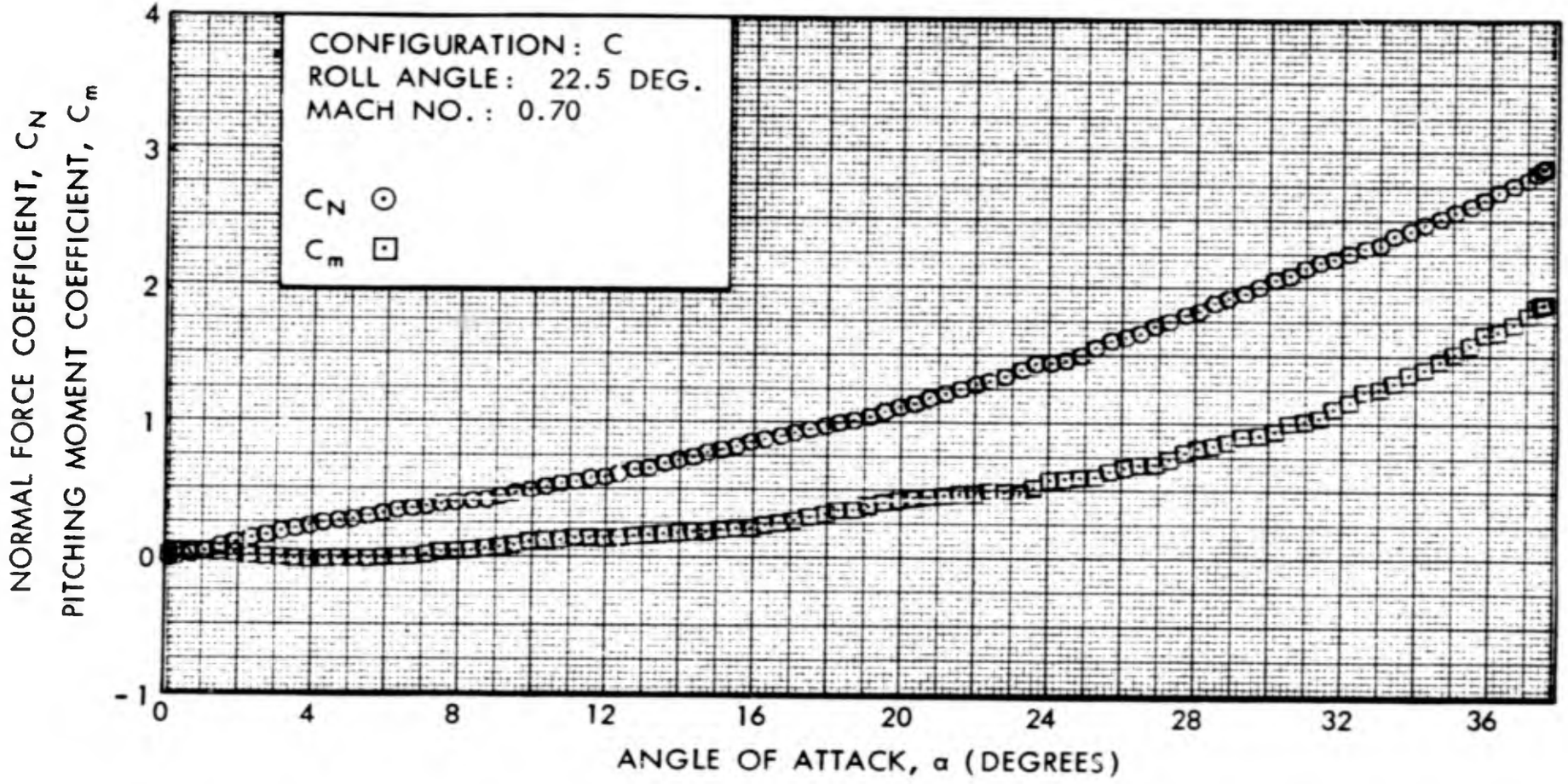
NOLR 61-89

FIG. 10 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



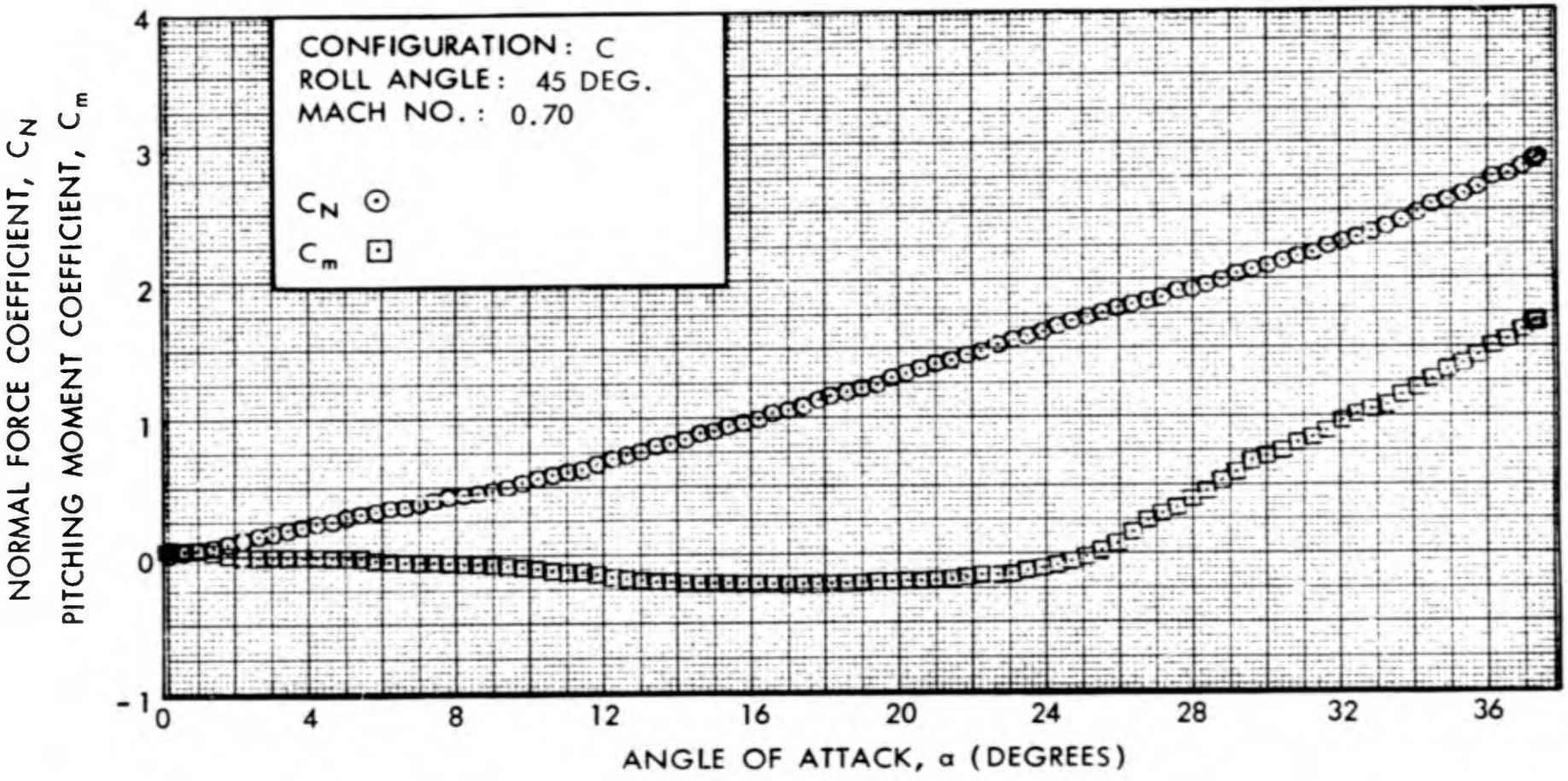
NOLTR 61-89

FIG. 11 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



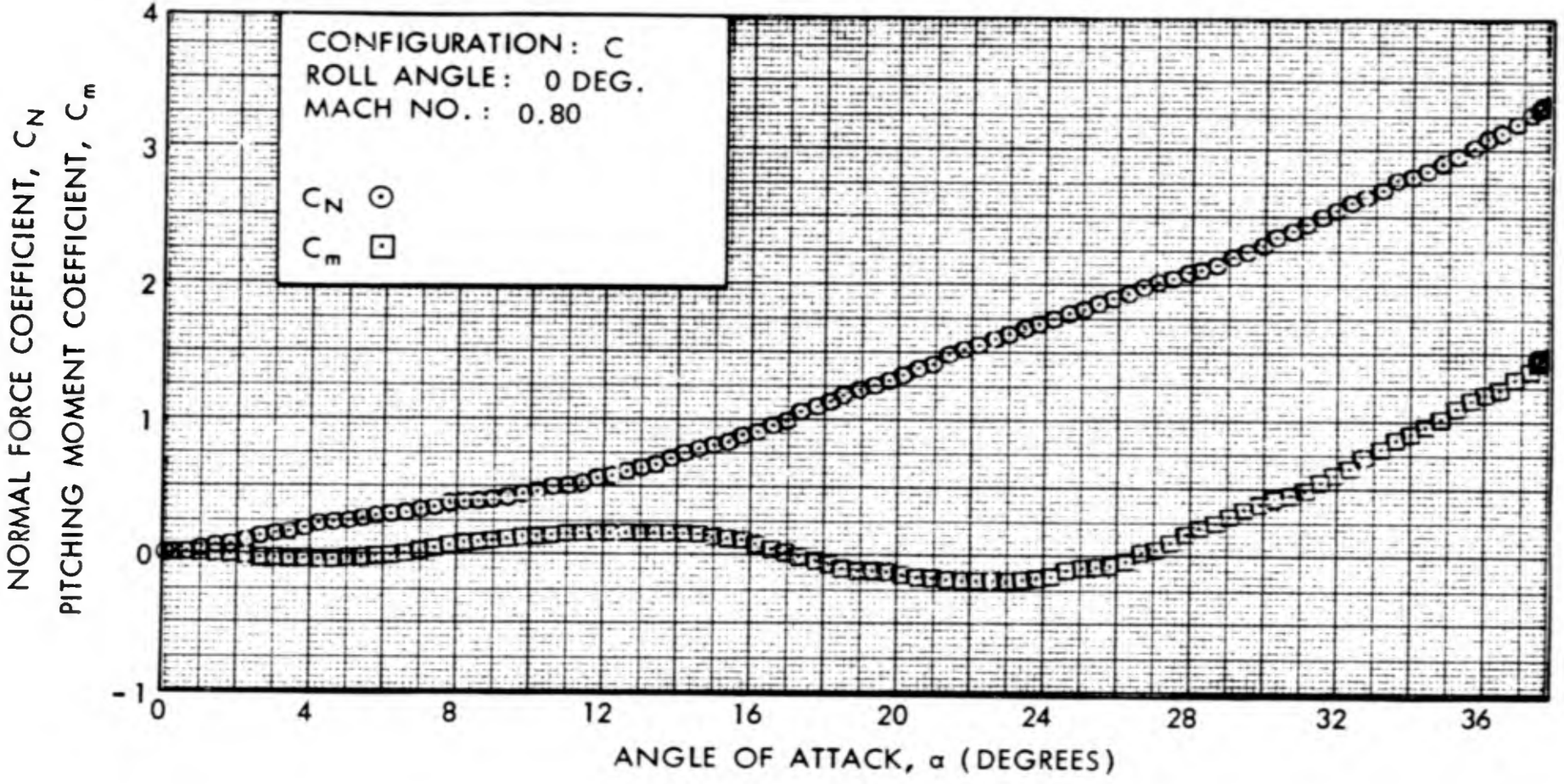
NOLTR 61-89

FIG. 12 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



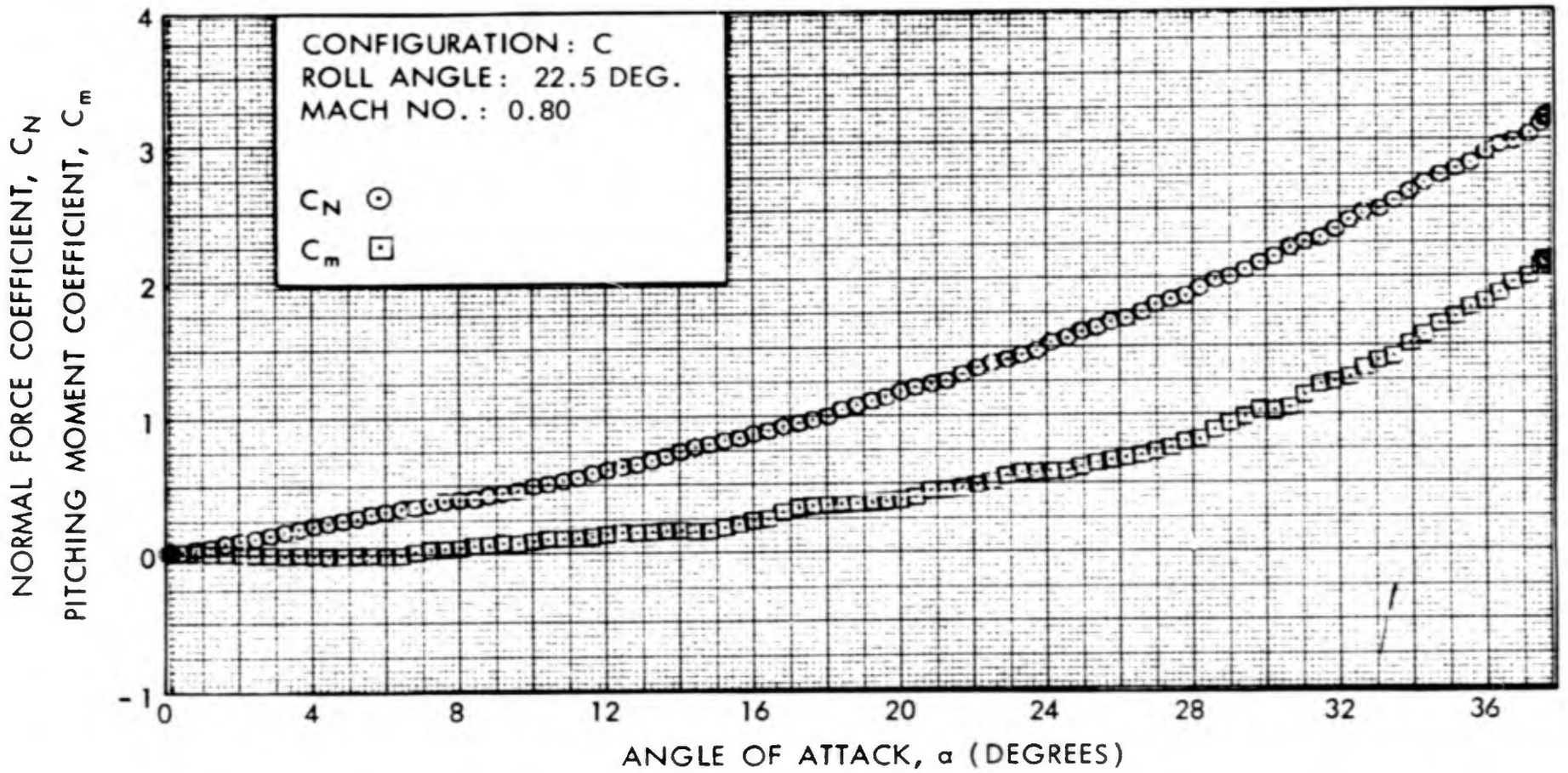
NOLR 61-89

FIG. 13 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



NOLTR 61-89

FIG. 14 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



NOLR 61-89

FIG. 15 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

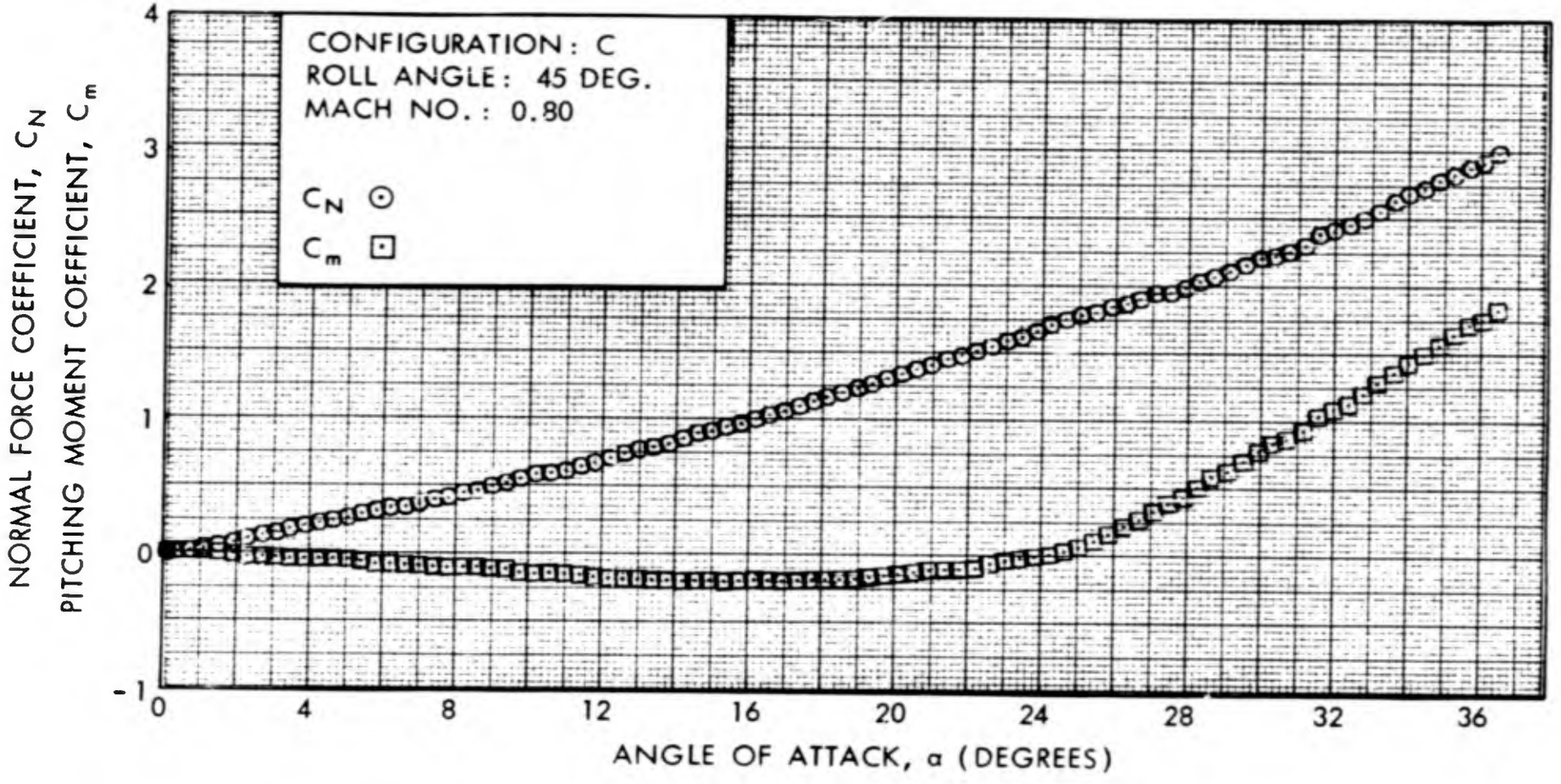


FIG. 16 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

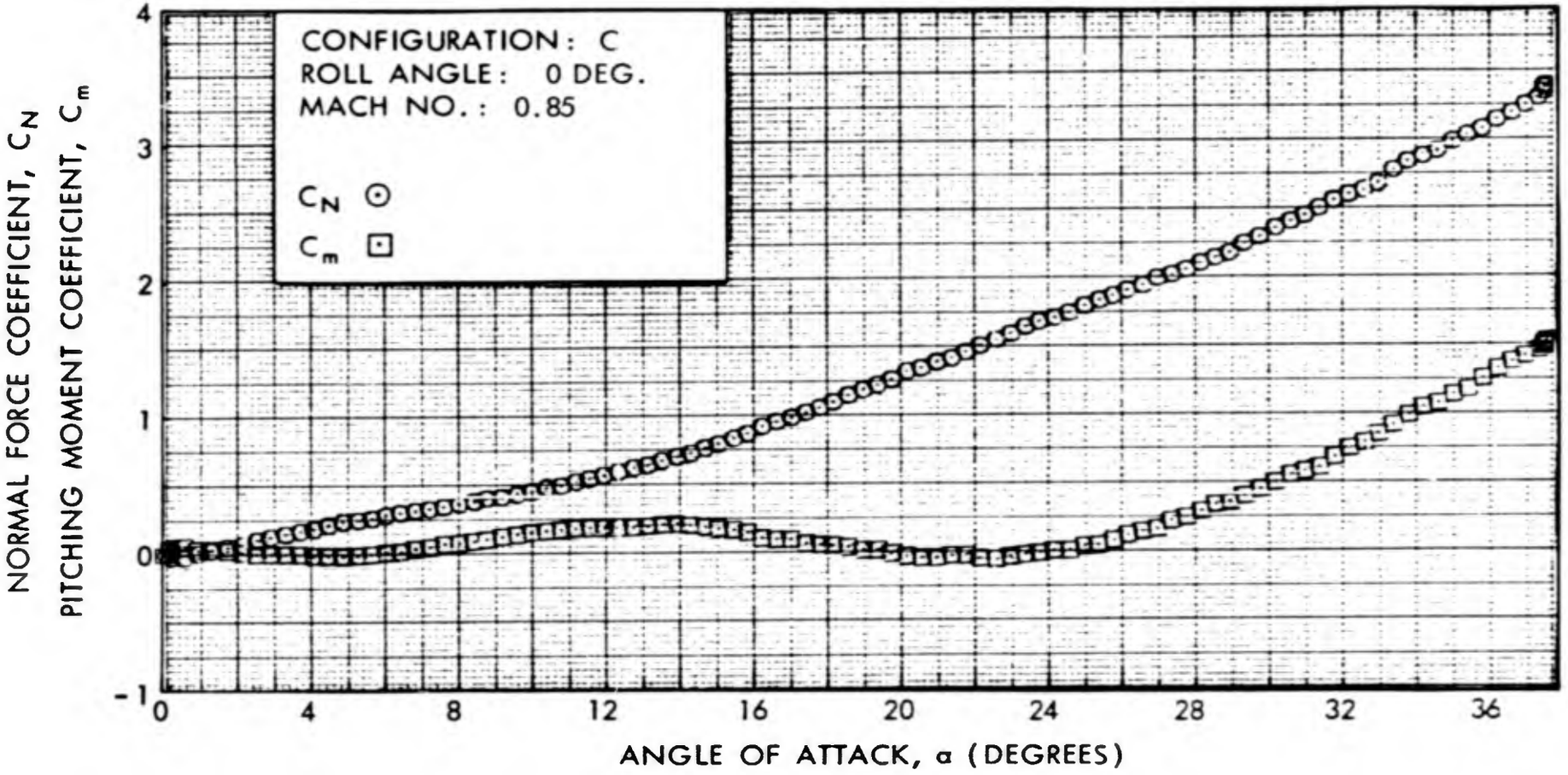
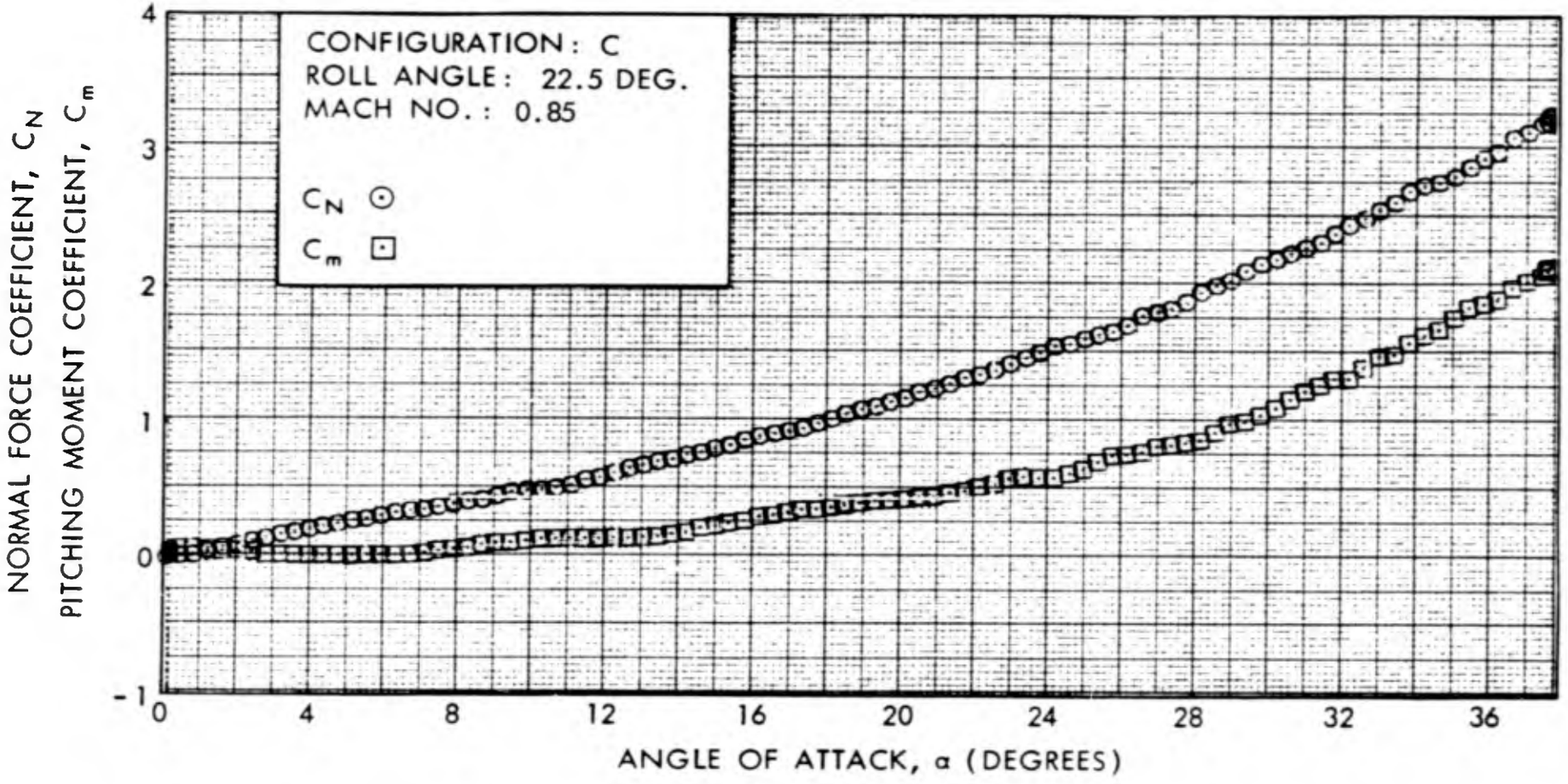


FIG. 17 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



NOLR 61-89

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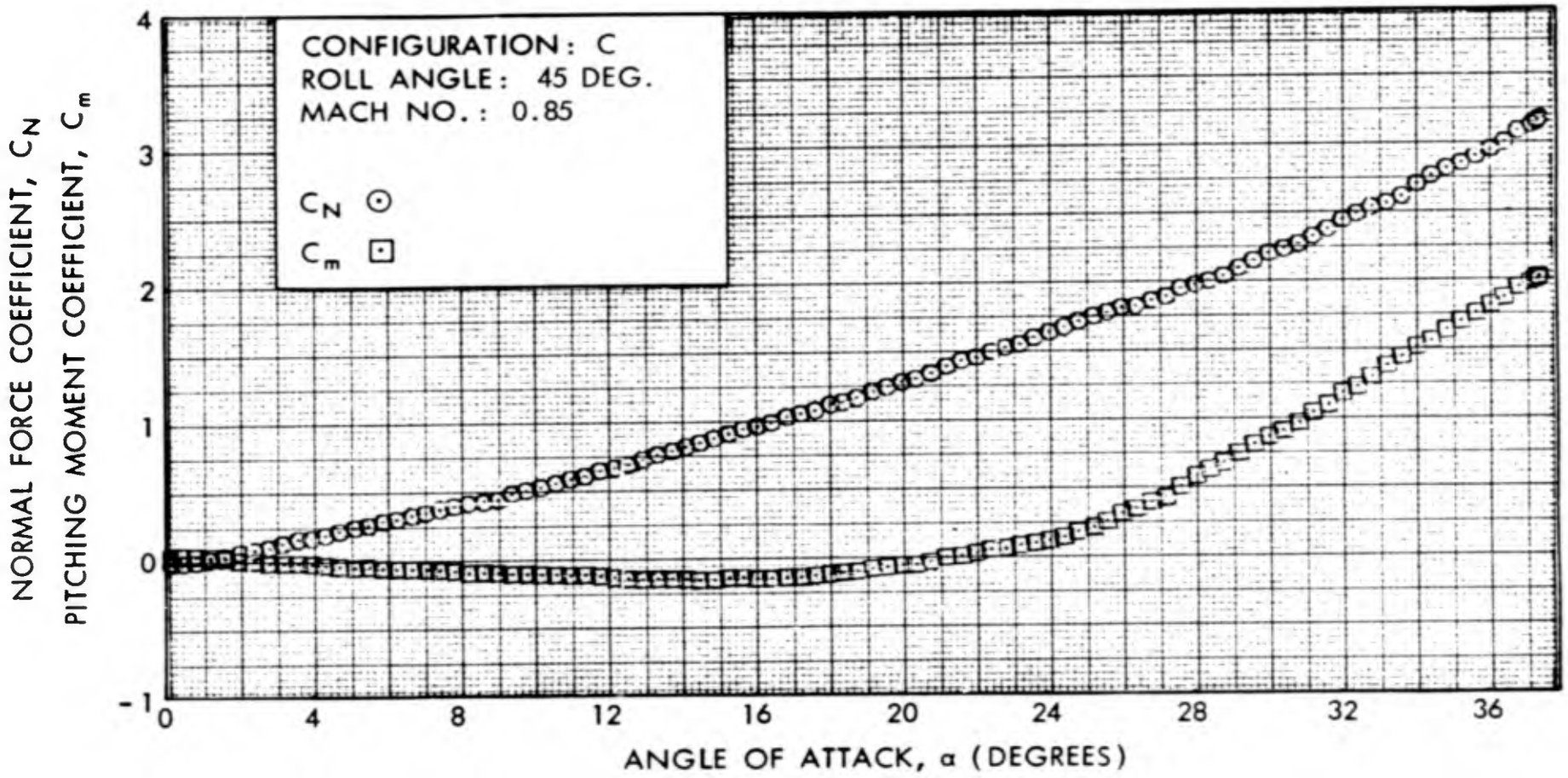

NOLTR 61-89

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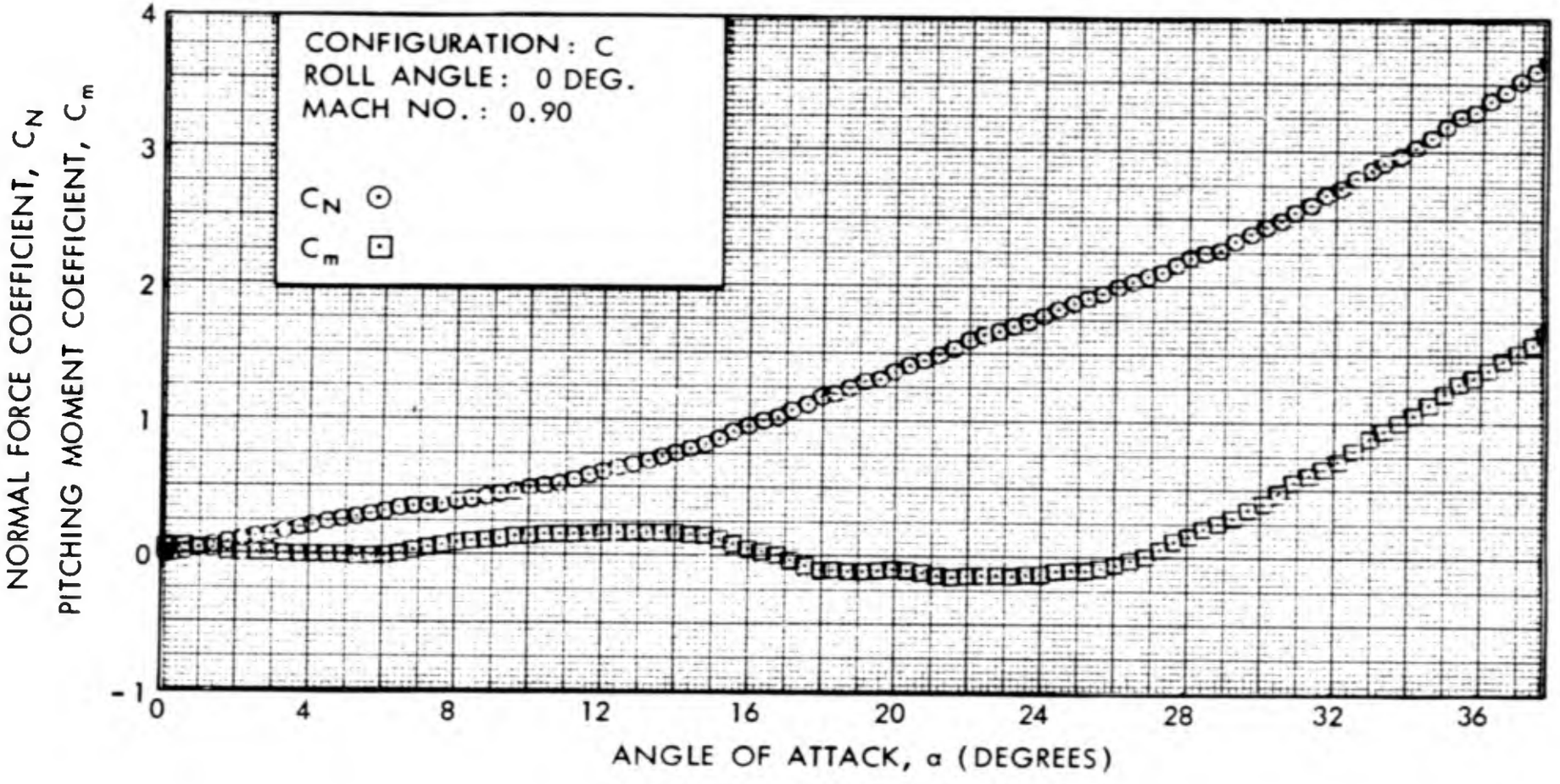

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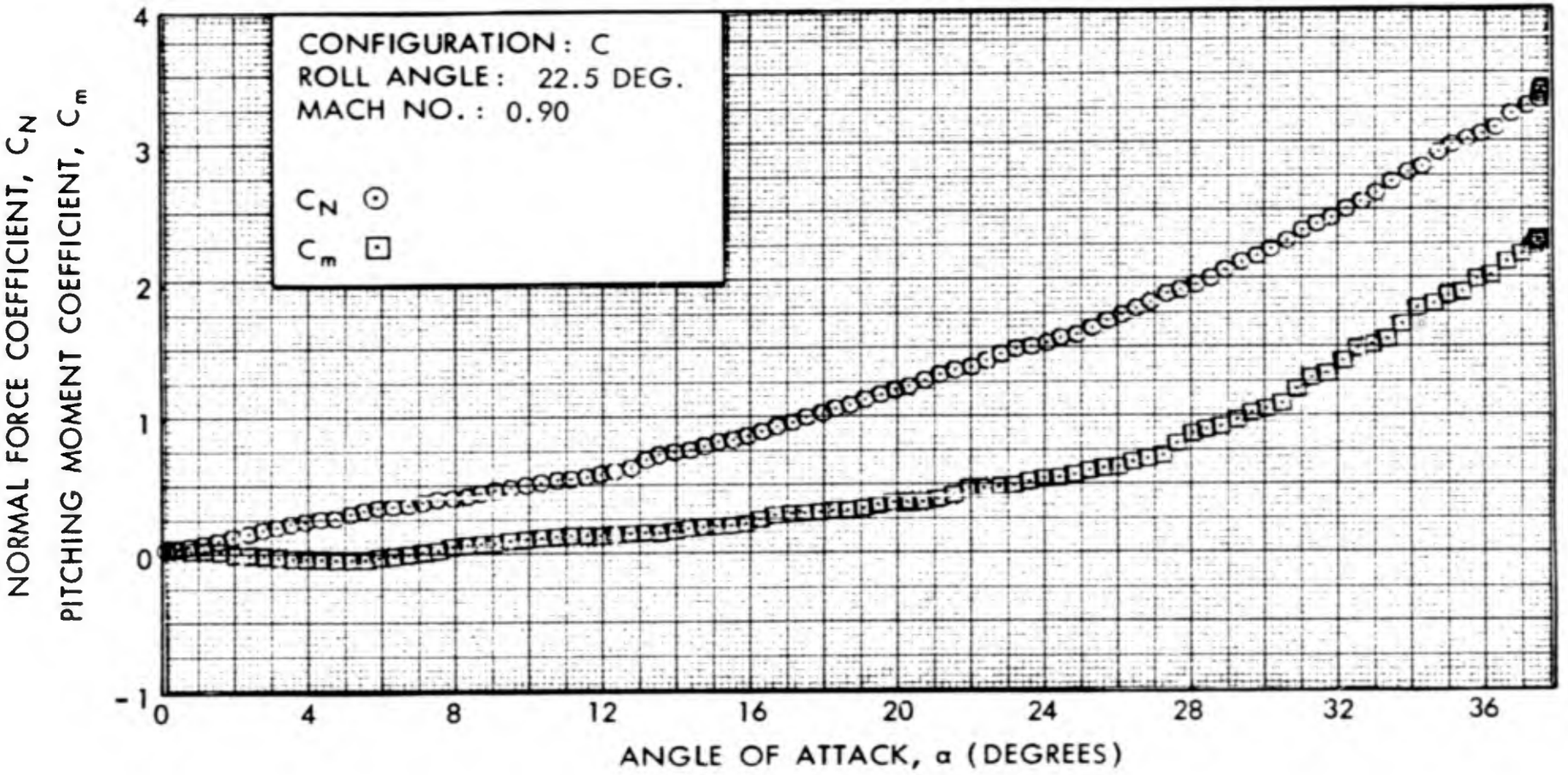

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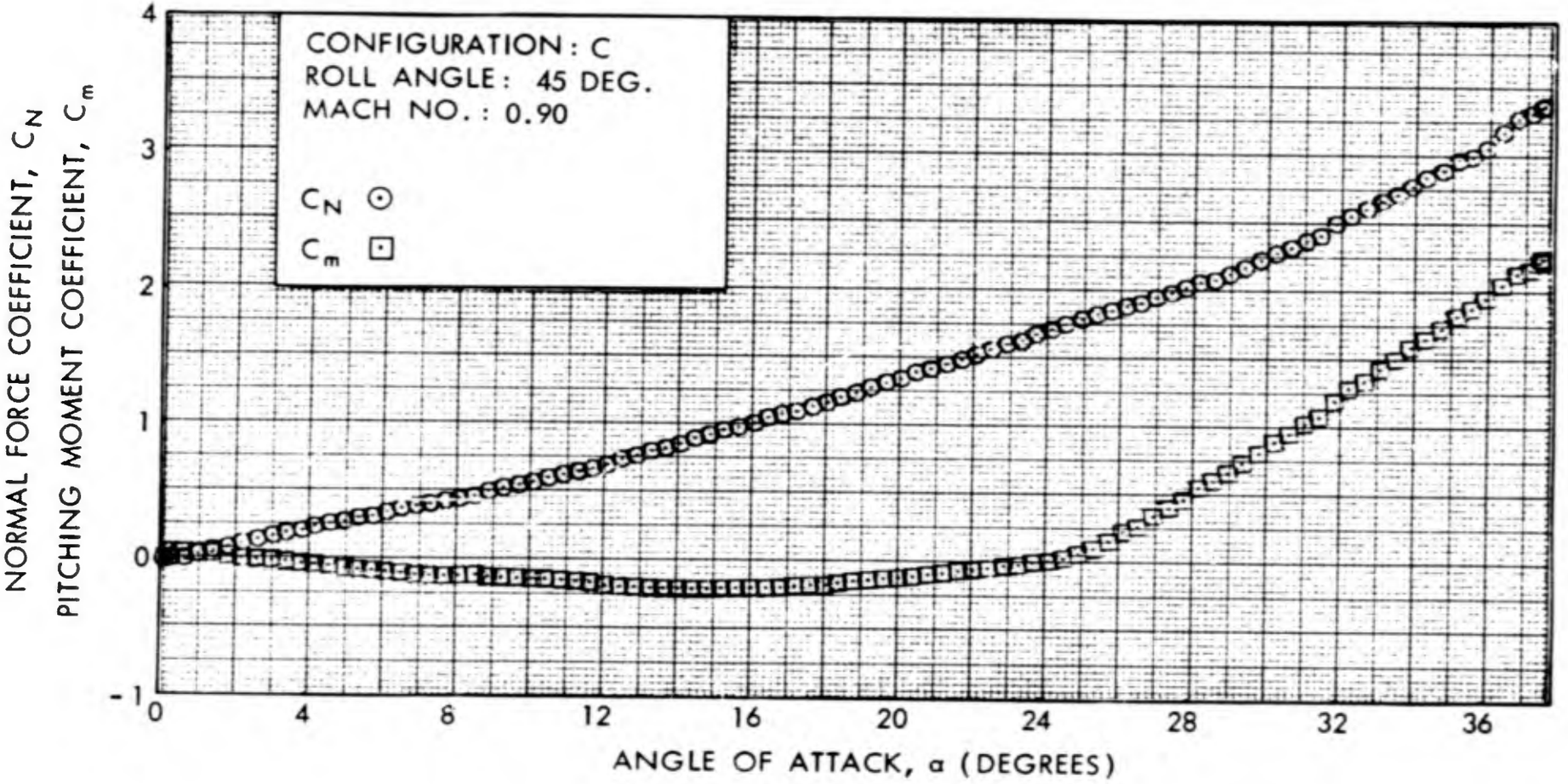

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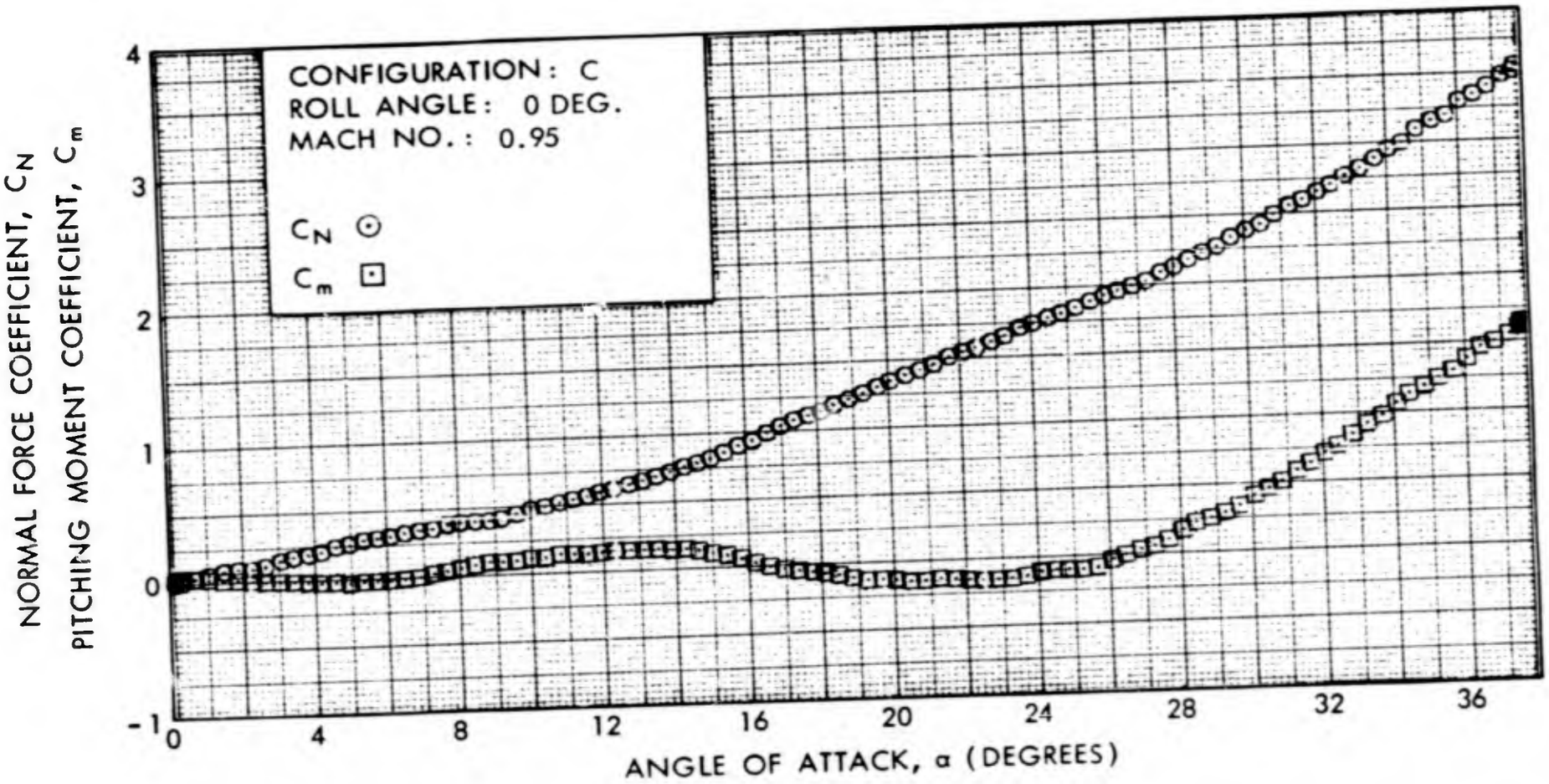

NOLR 61-89

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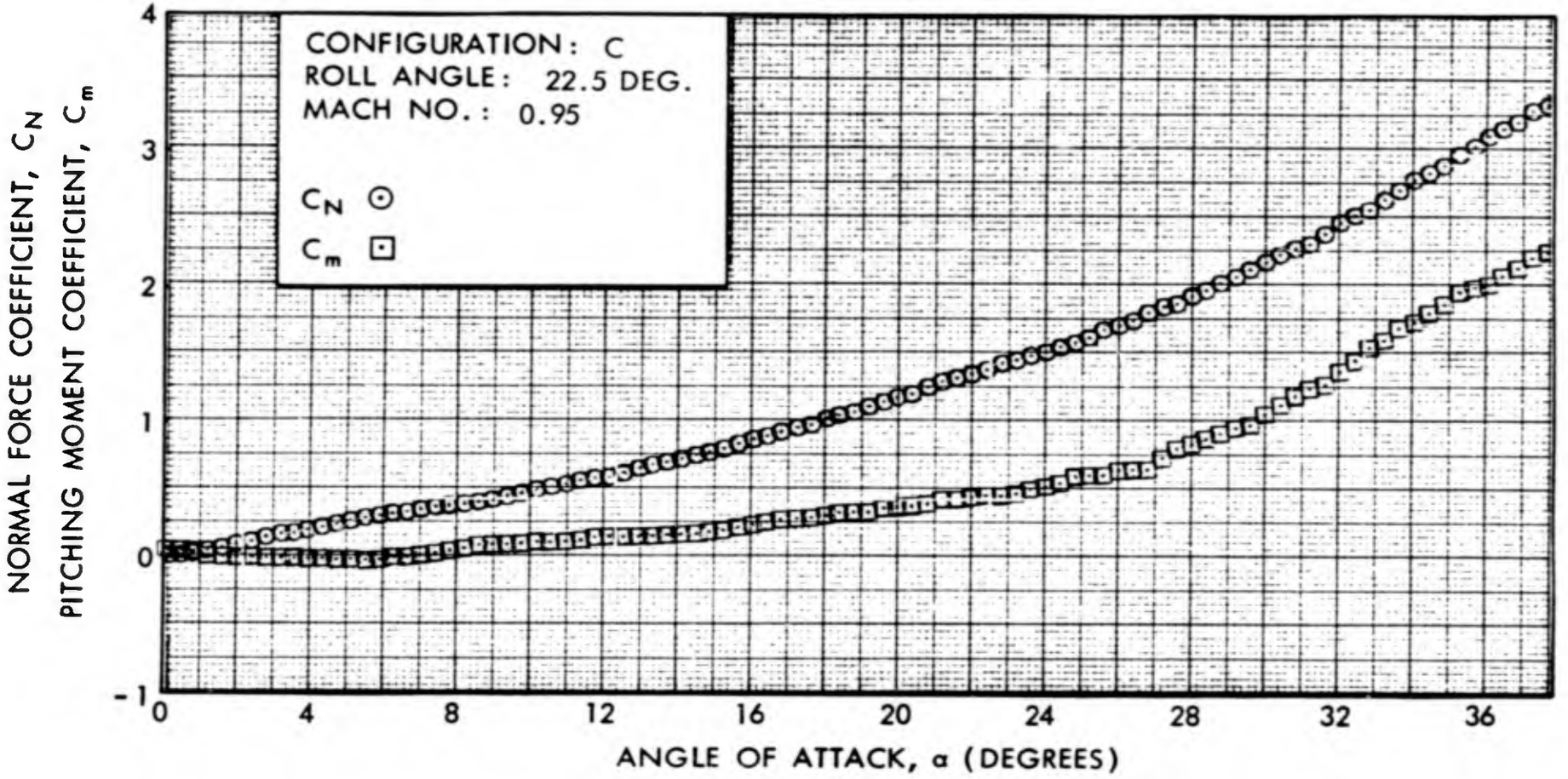
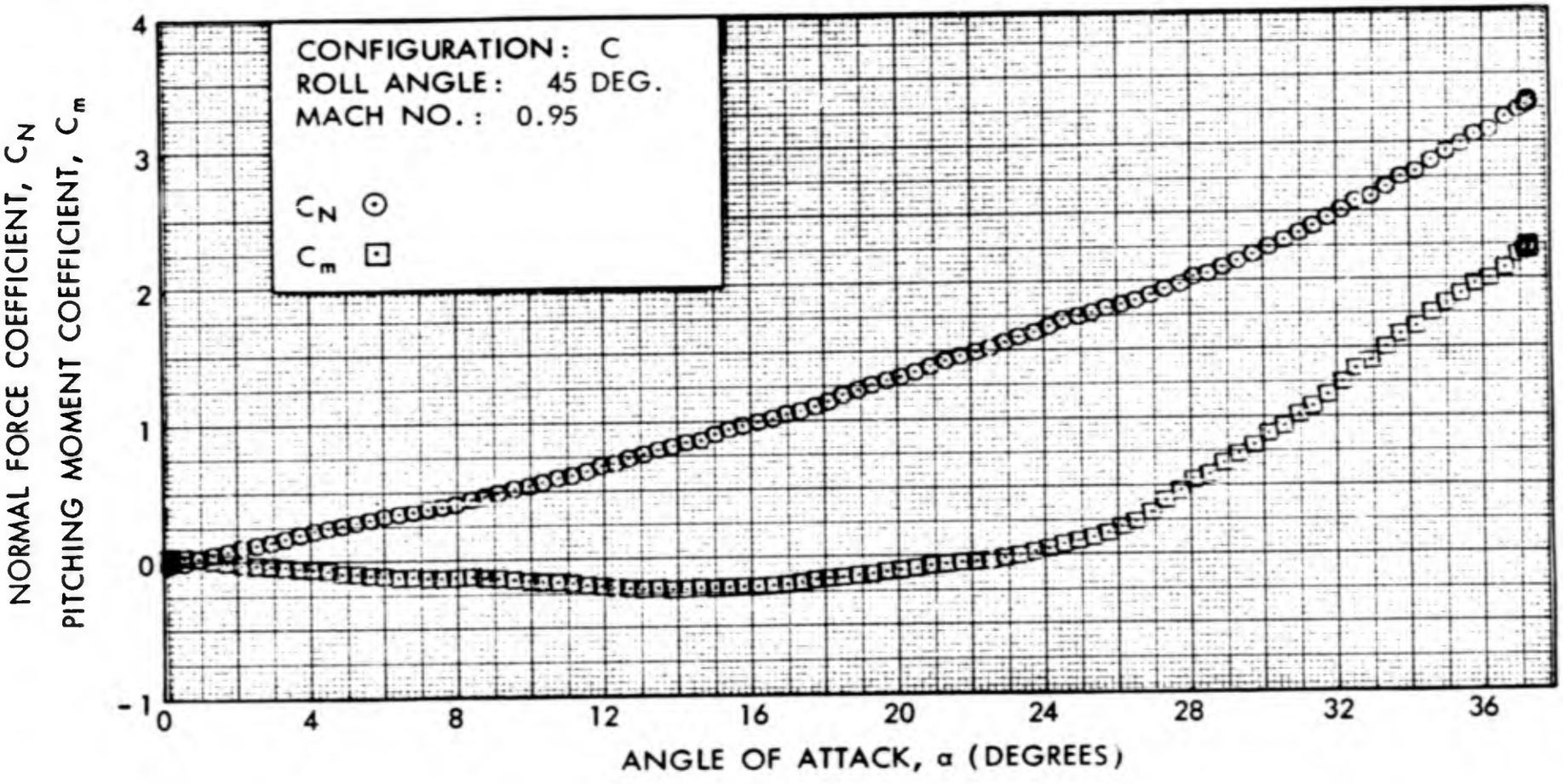


NOLTR 61-89

FIG. 24 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



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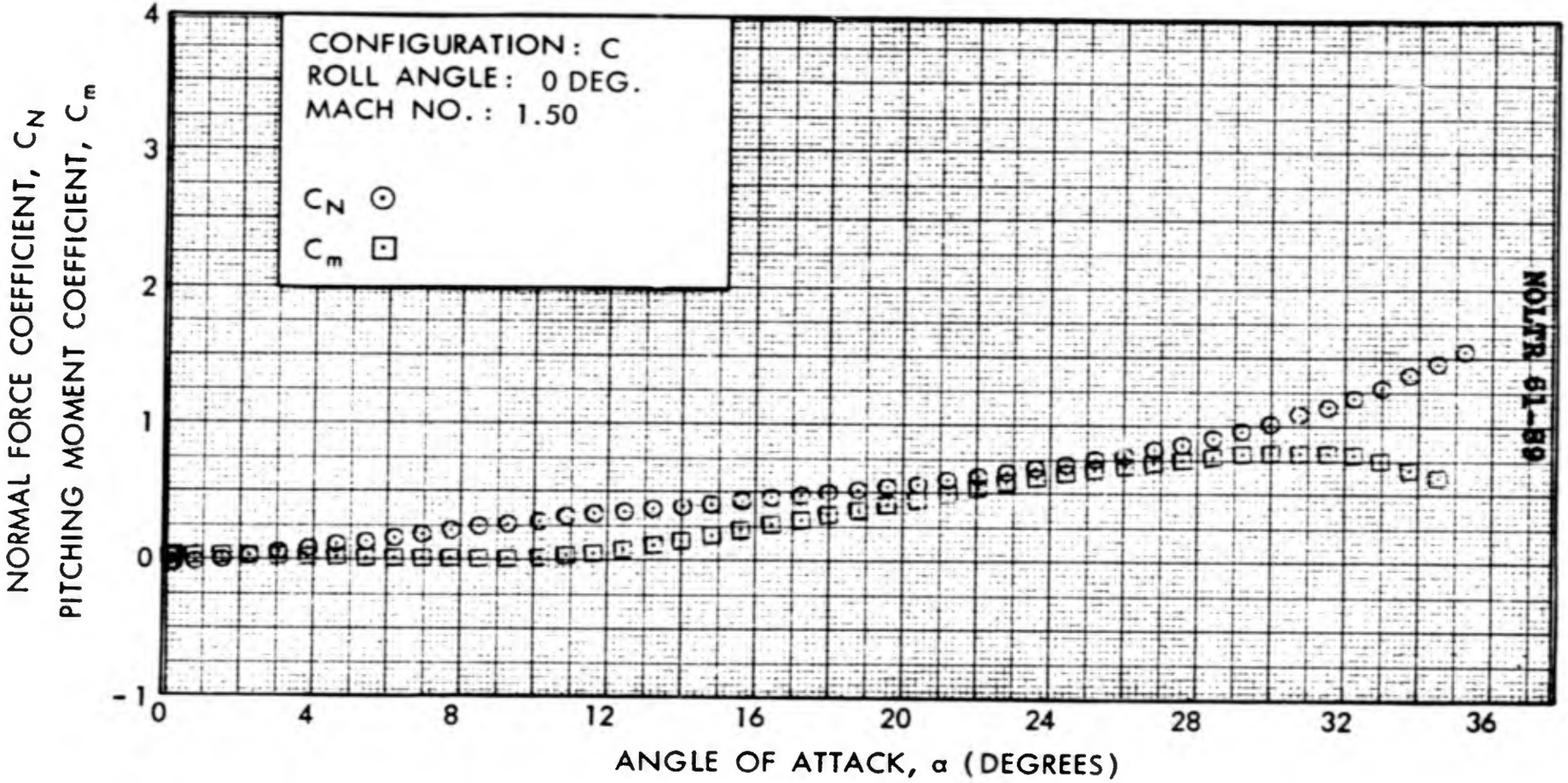
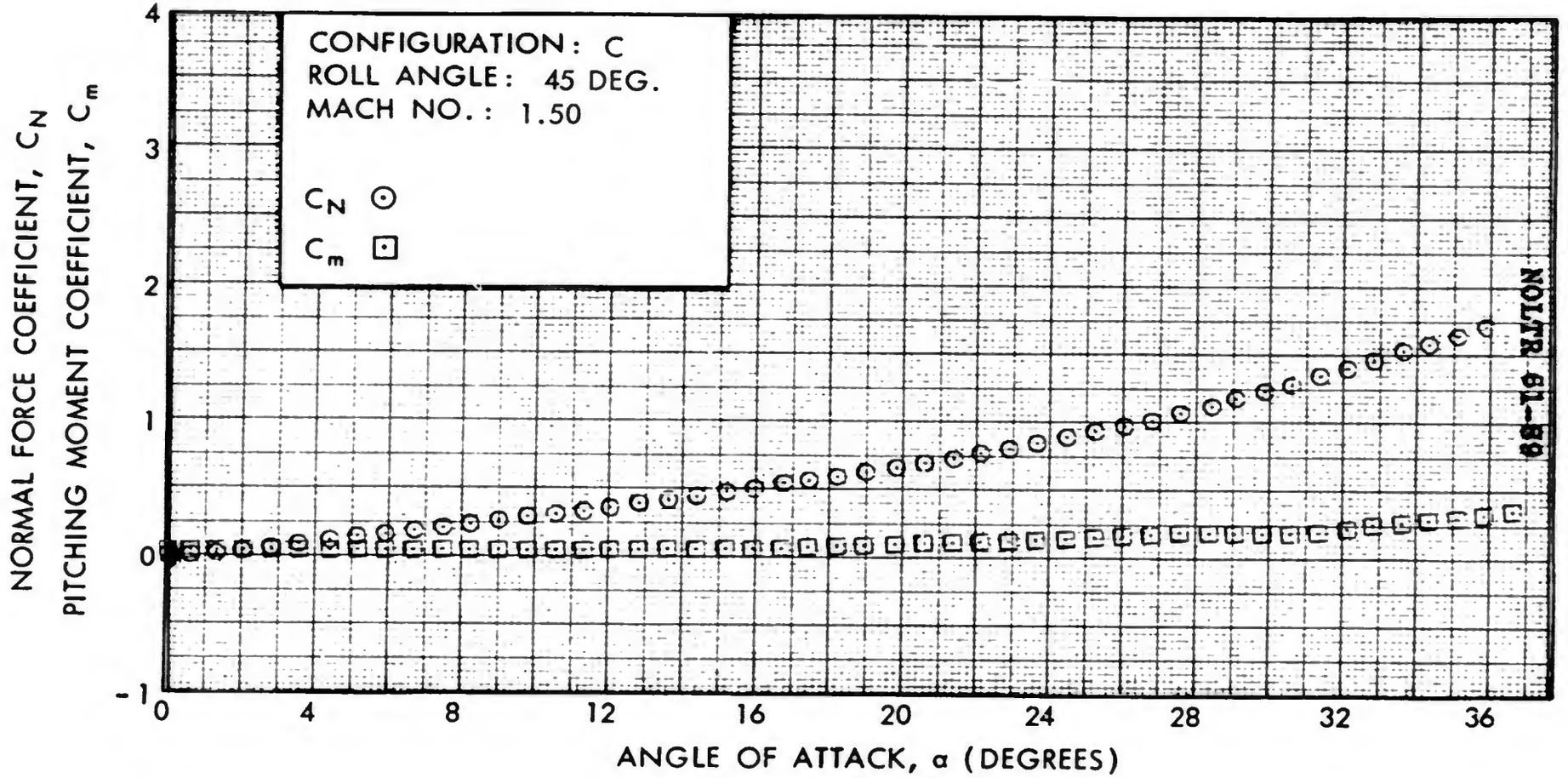


NOLTR 61-89

FIG. 26 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

FIG. 27 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



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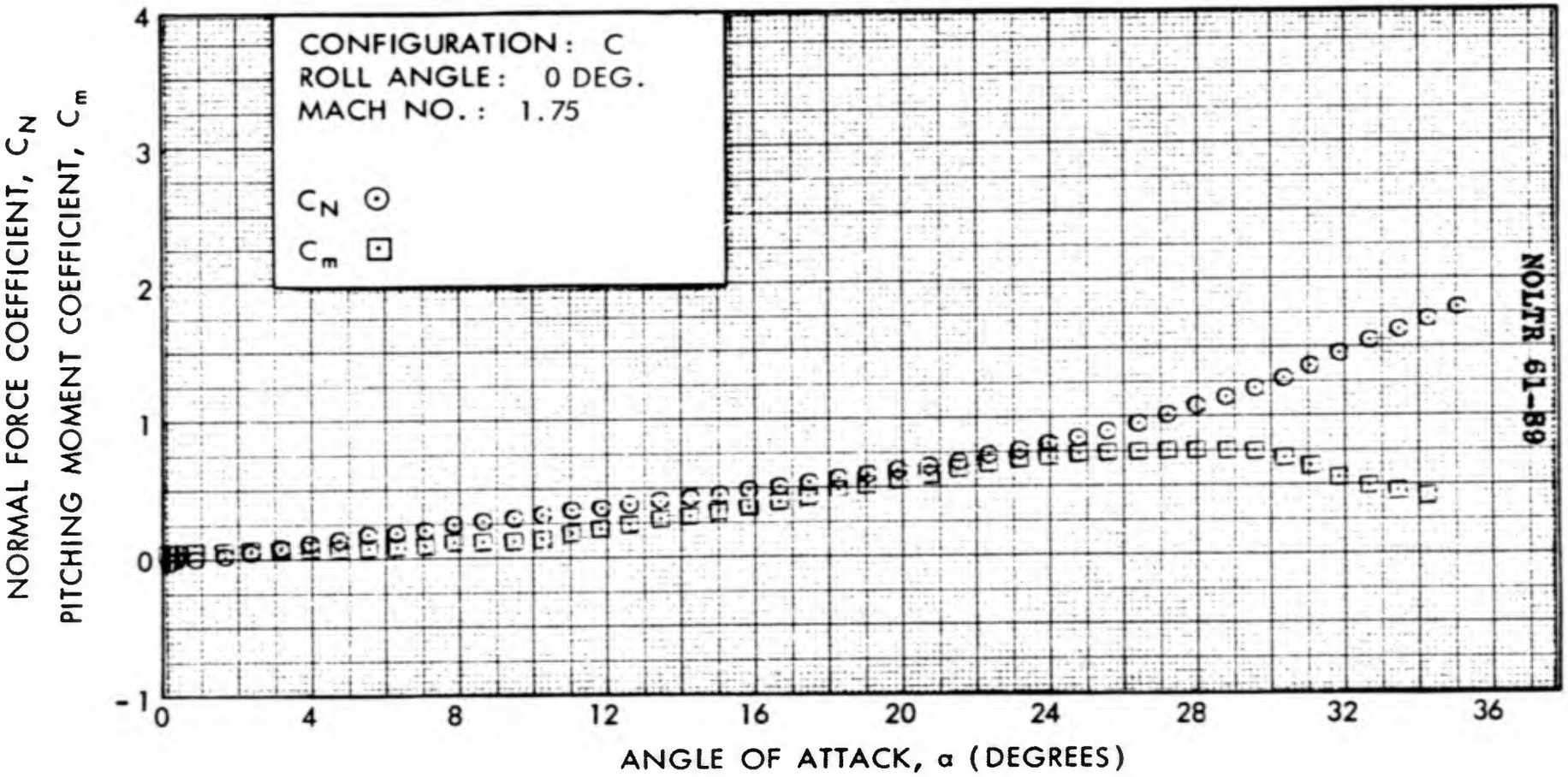

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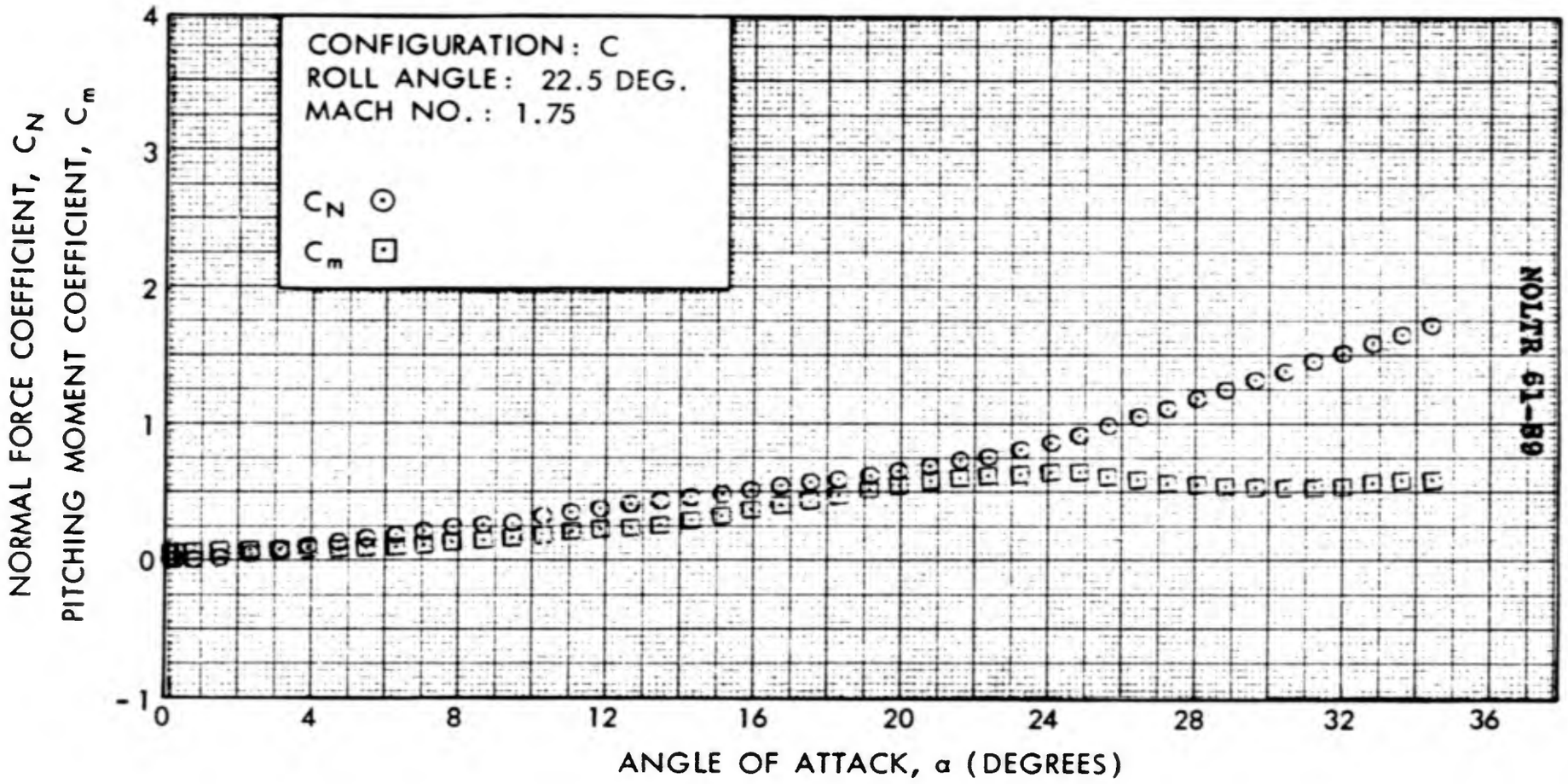
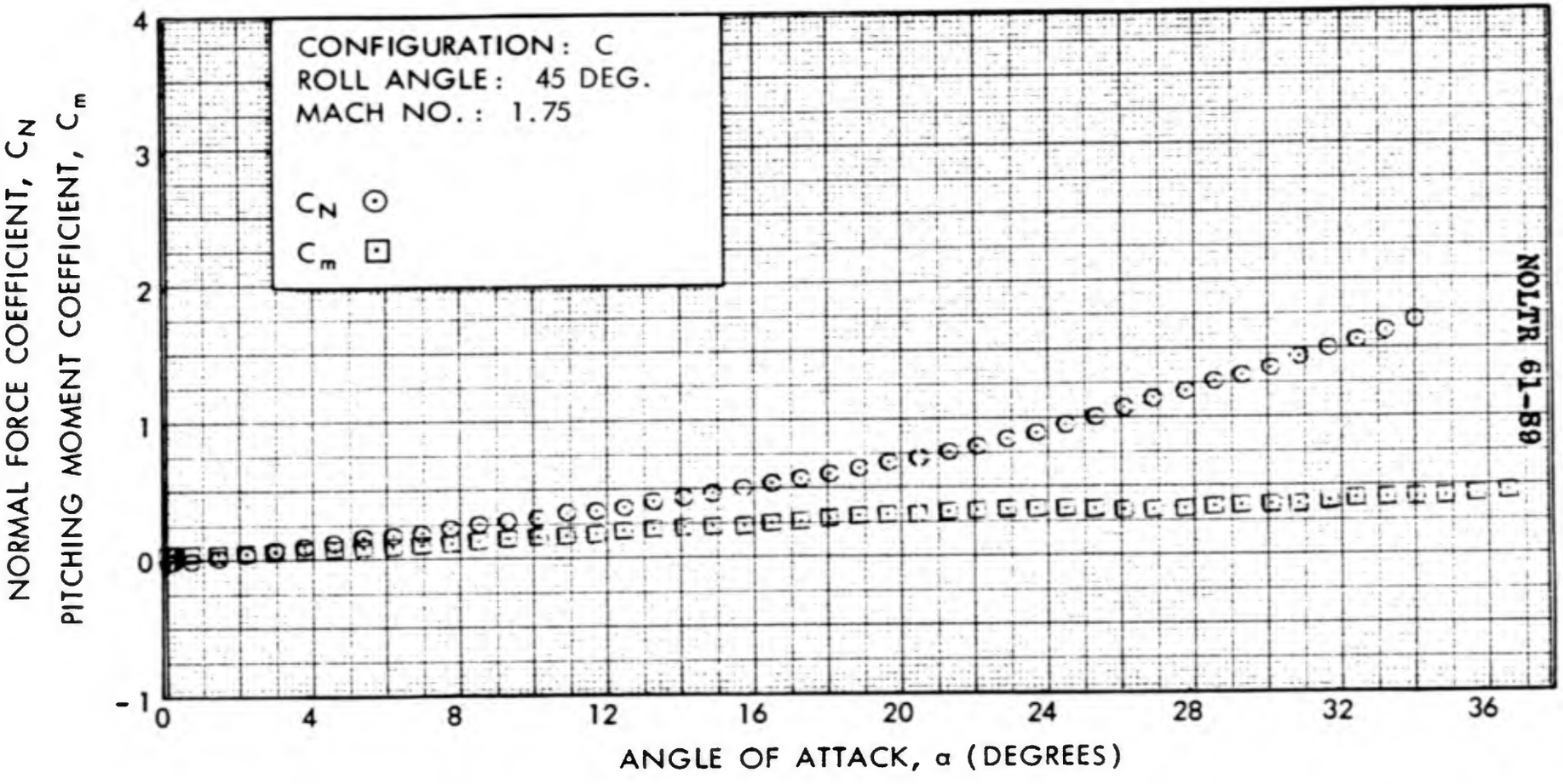


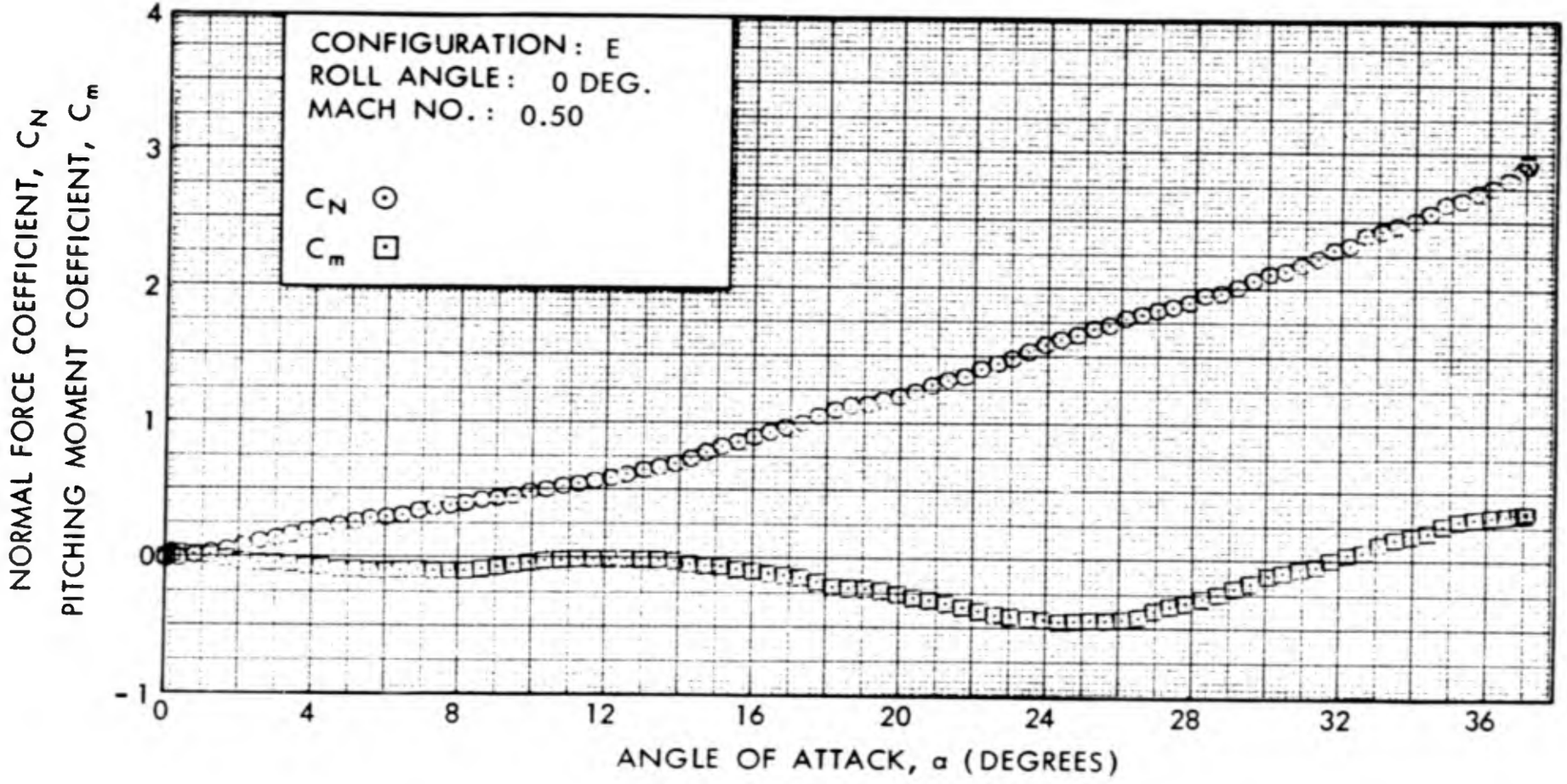
NOLTR 61-89

FIG. 30 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



NOLTR 61-89

FIG. 31 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



NOLR 61-89

FIG. 32 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

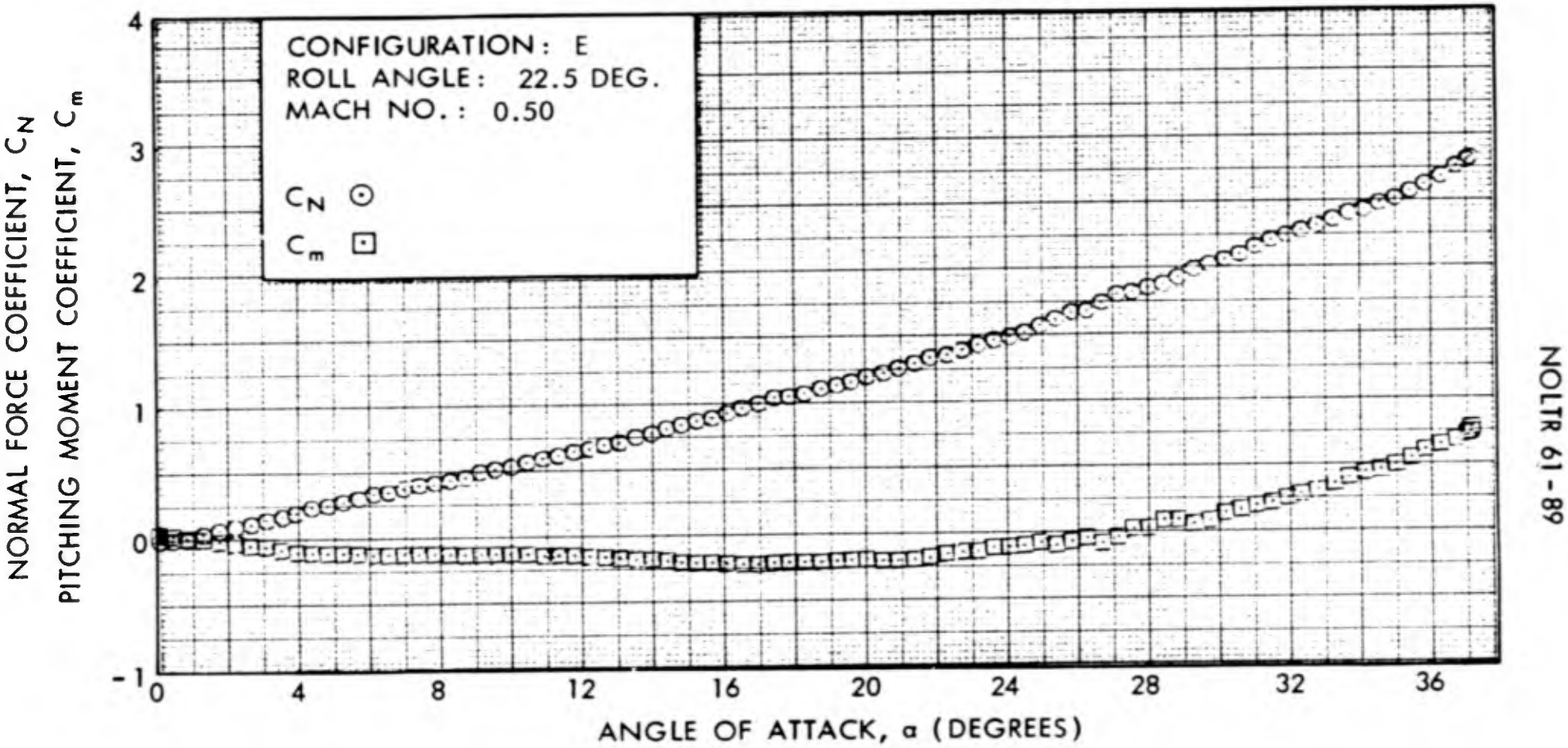


FIG. 33 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

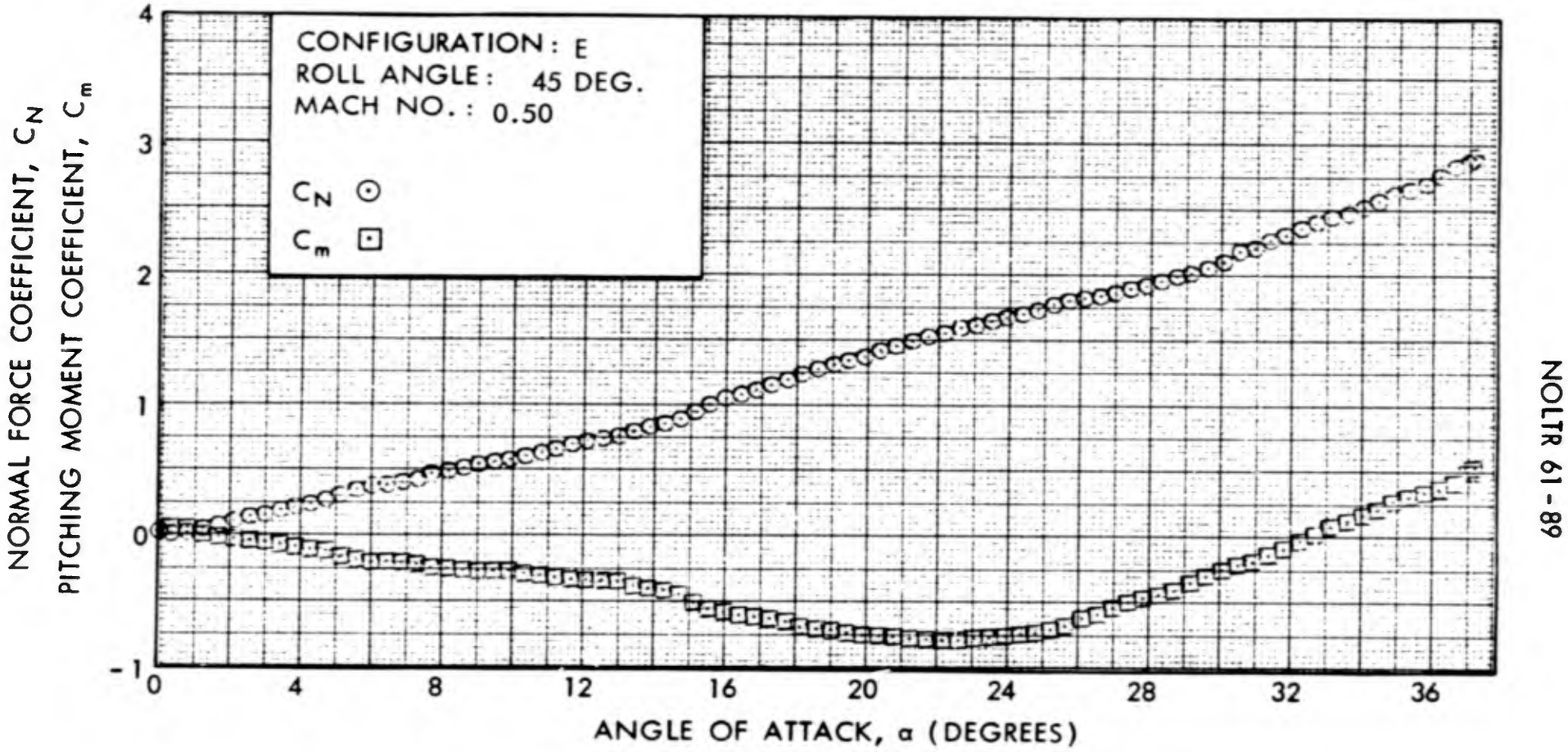
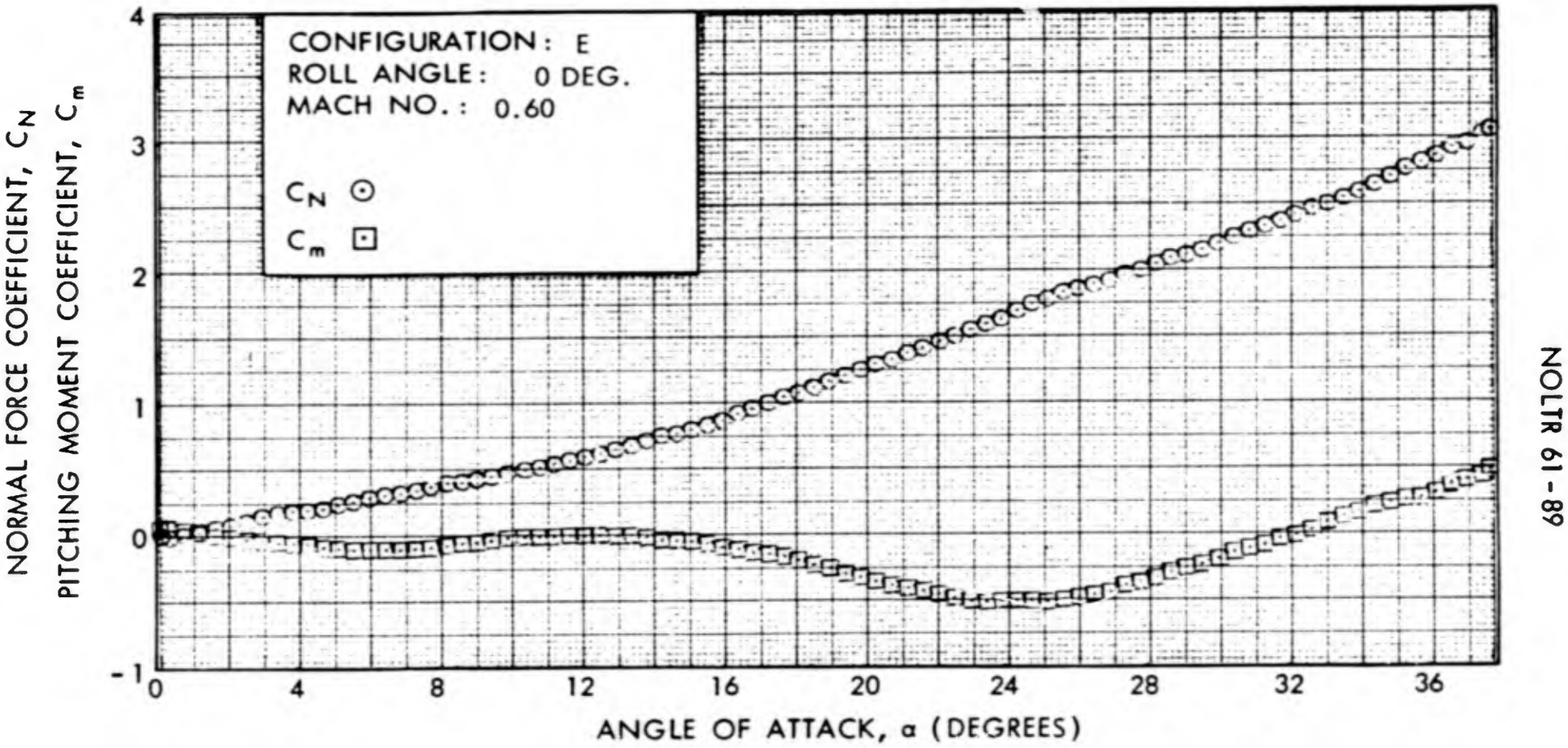


FIG. 34 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



NOLR 61-89

FIG. 35 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

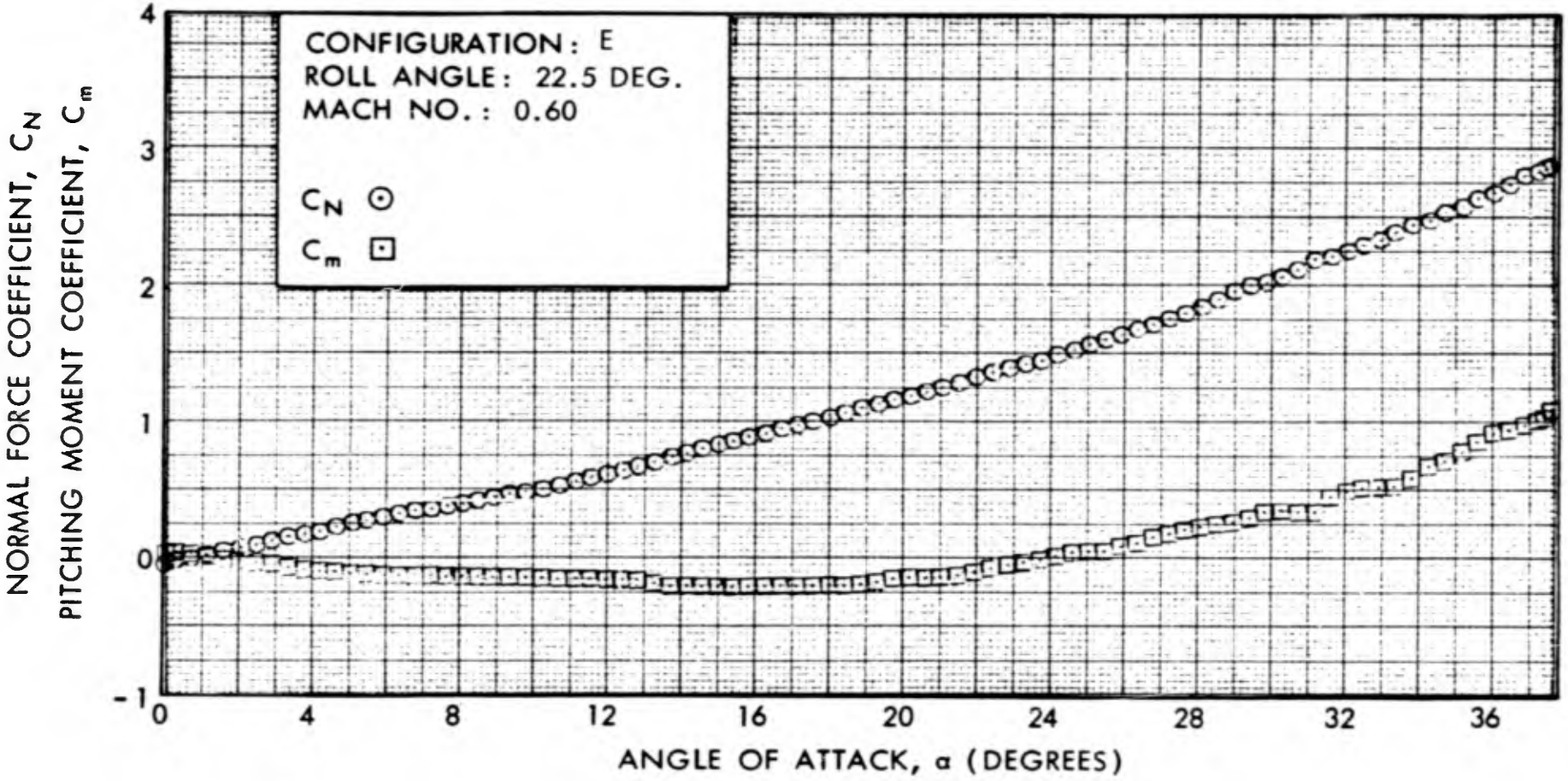
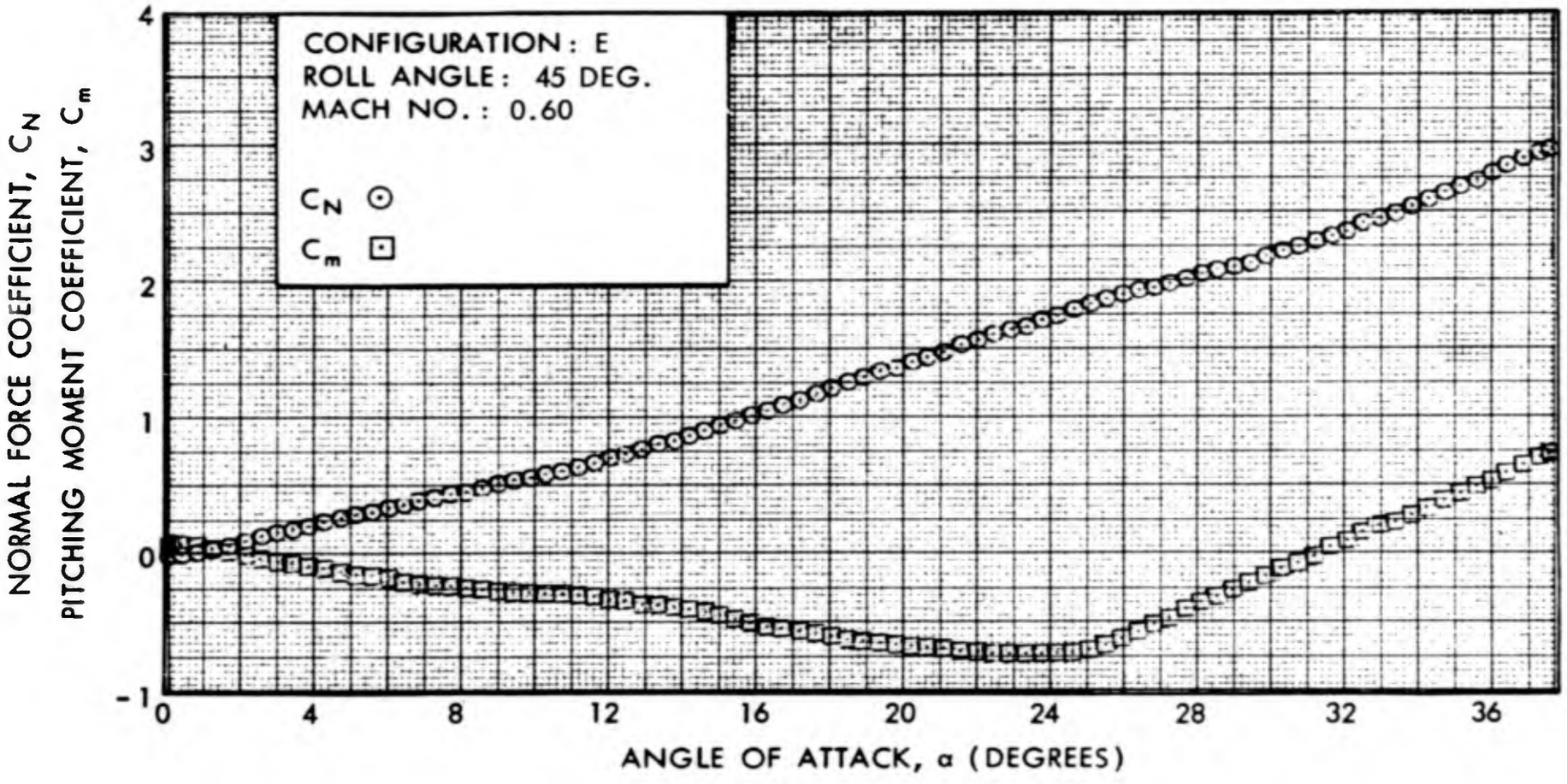
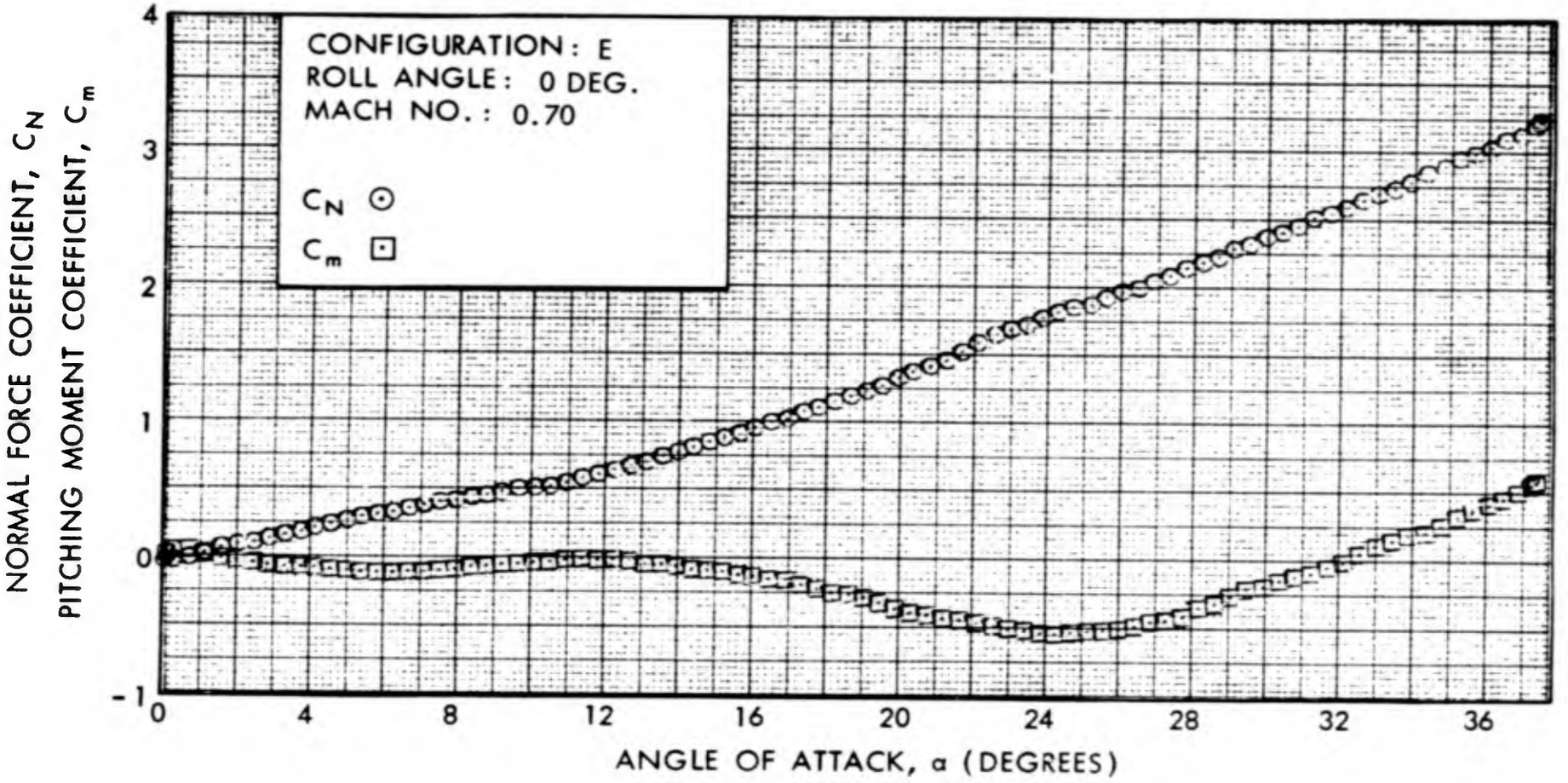


FIG. 36 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



NOLTR 61-89

FIG. 37 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



NOLTR 61-88

FIG. 38 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

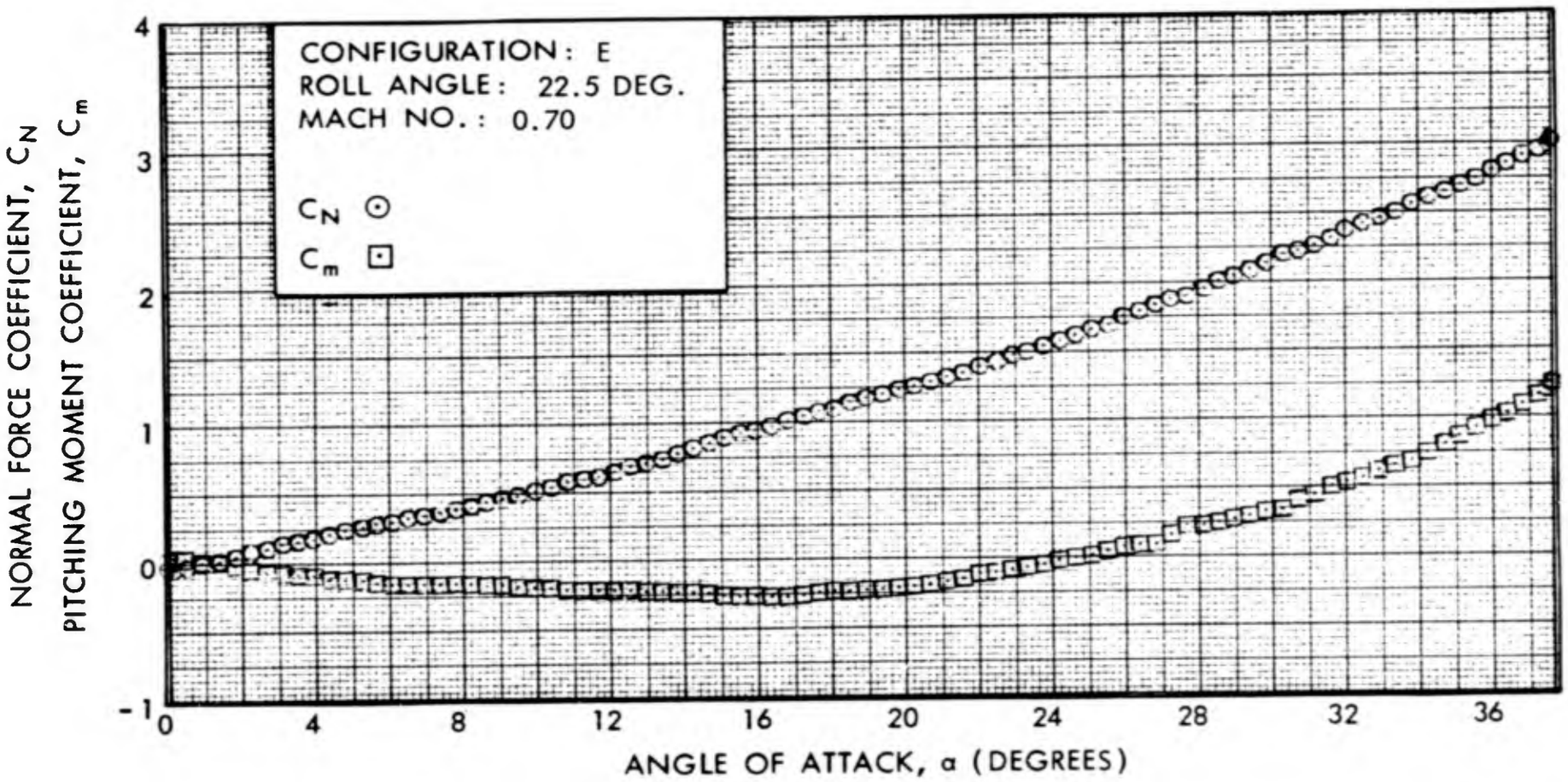


FIG. 39 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

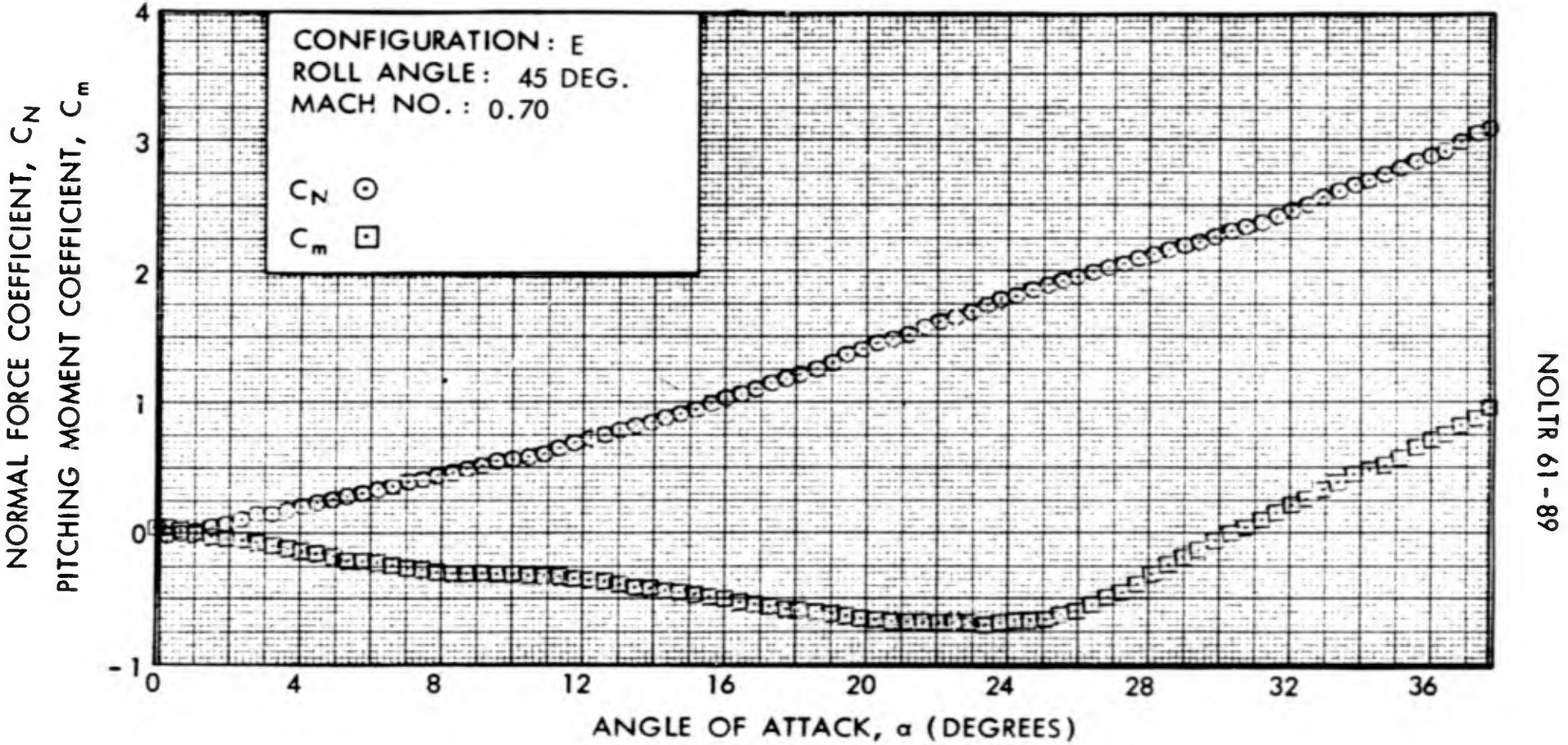
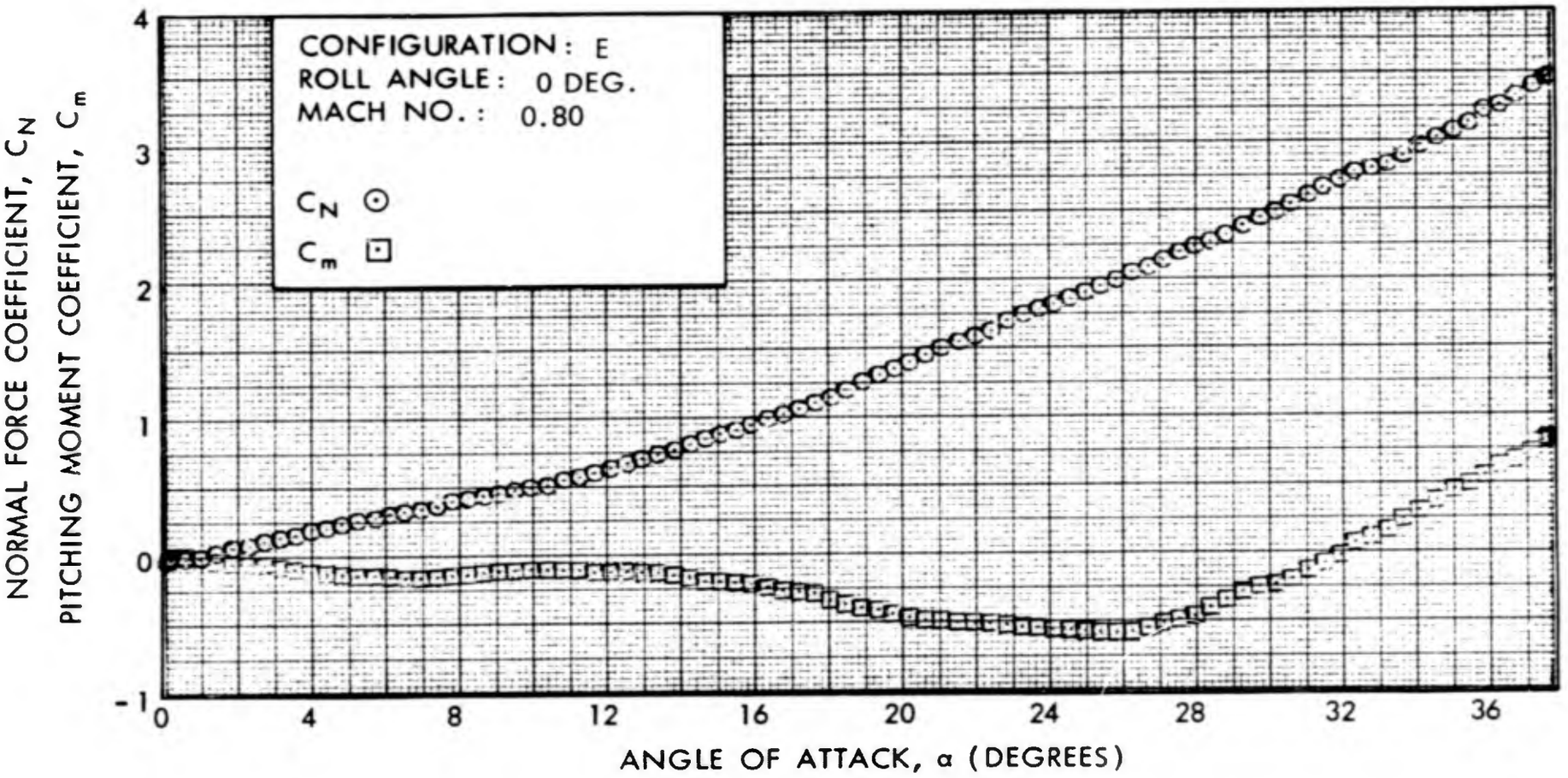


FIG. 40 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



NOLTR 61-89

FIG. 41 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

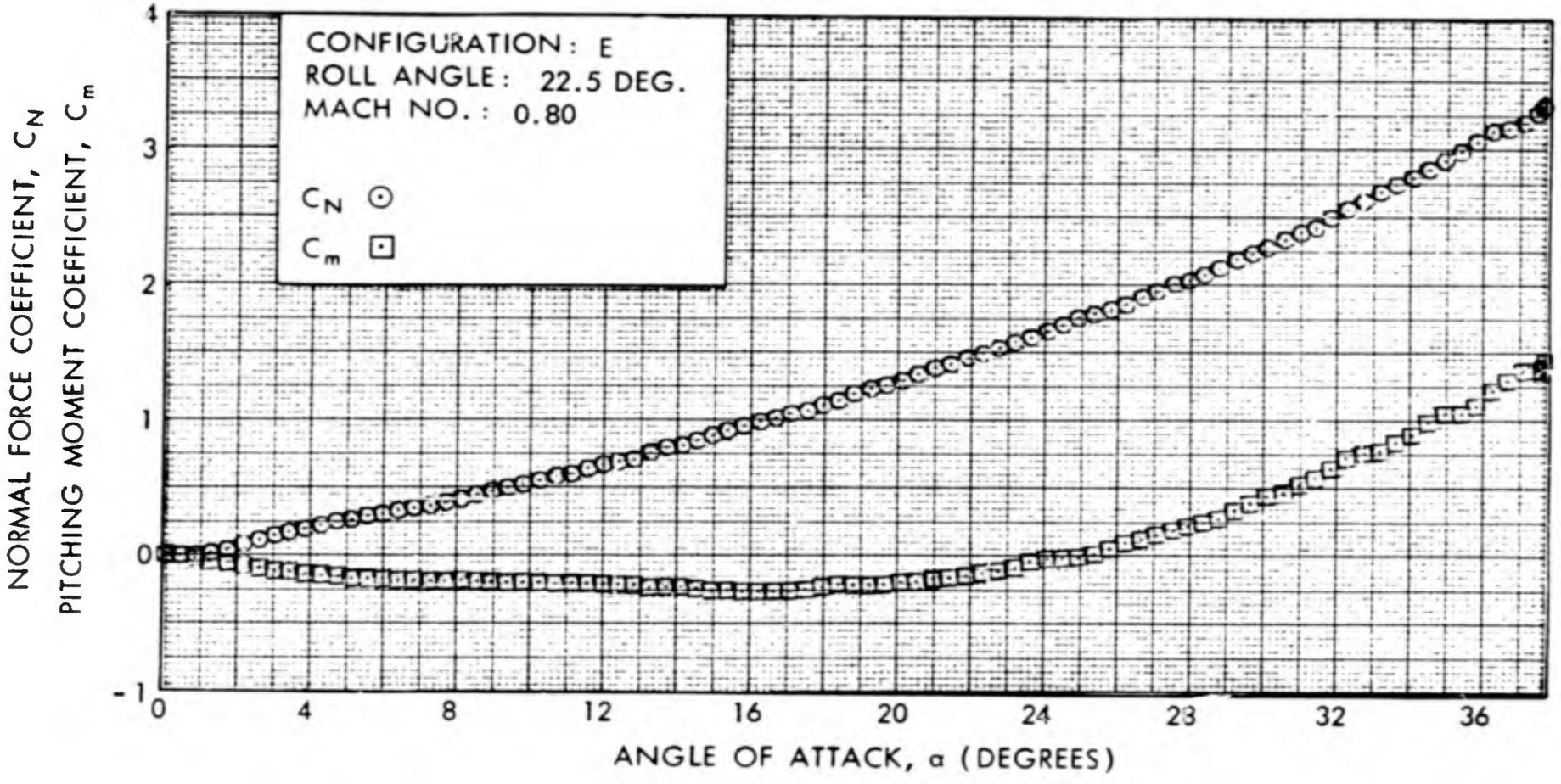
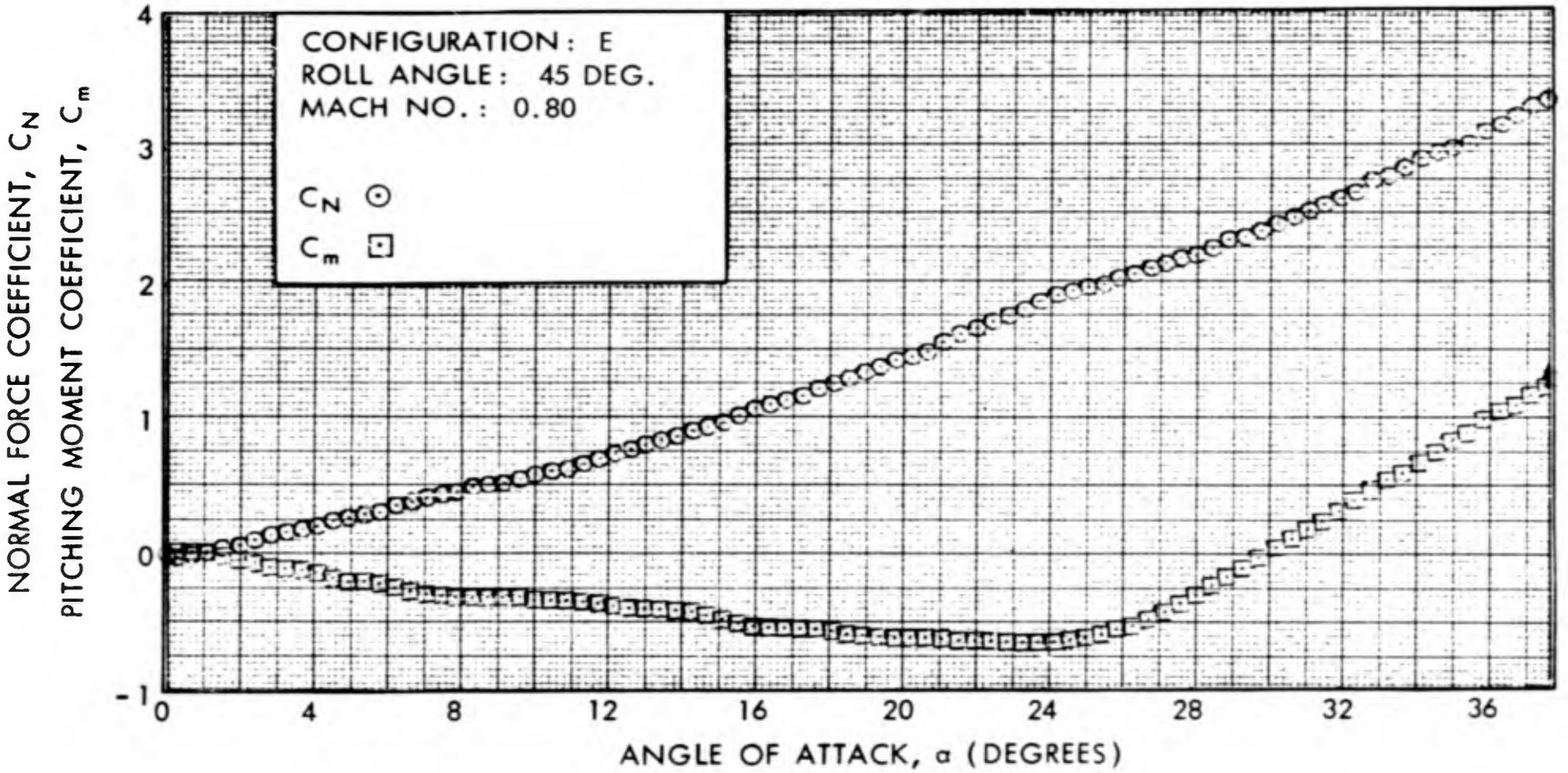
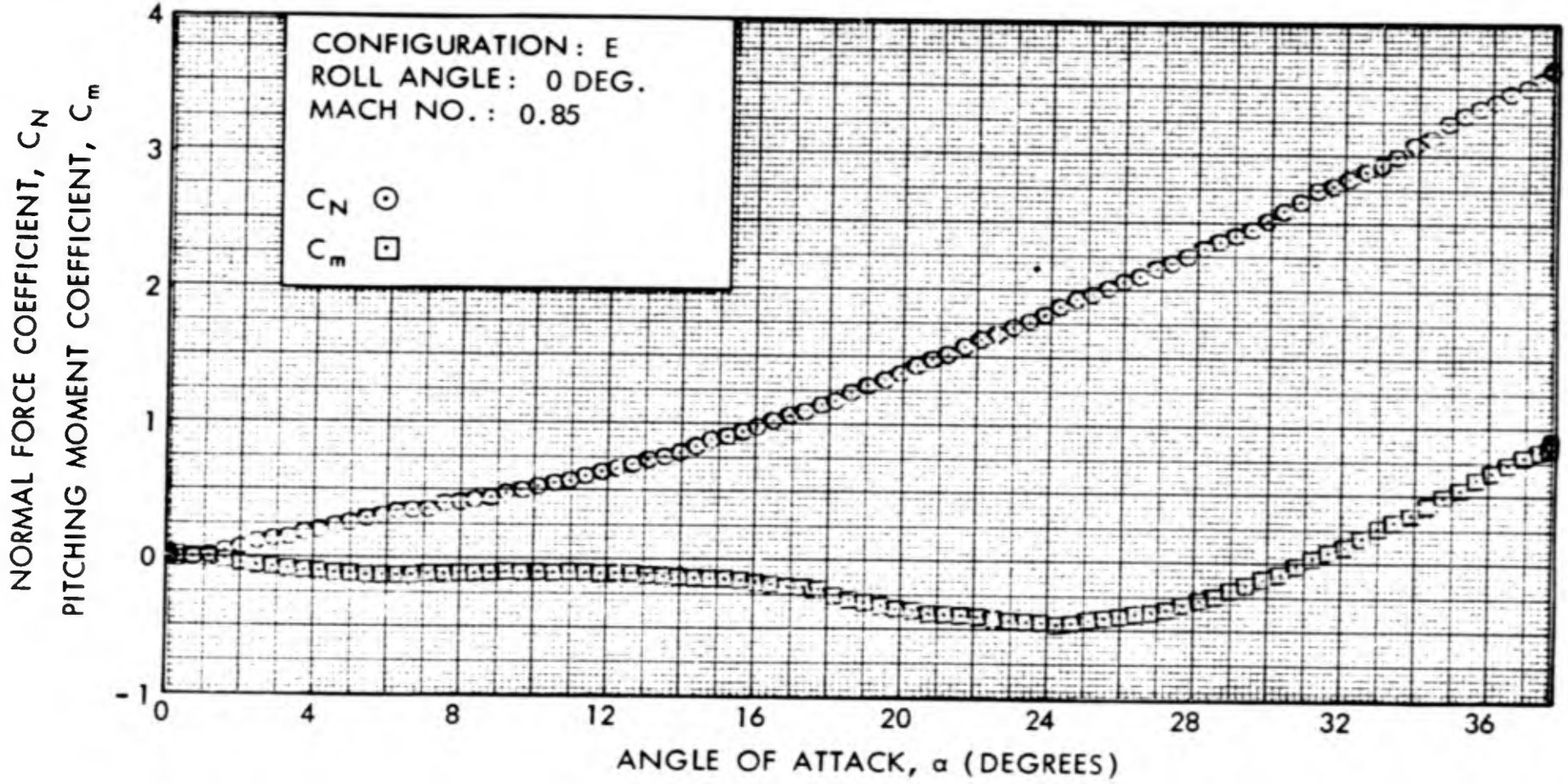


FIG. 42 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



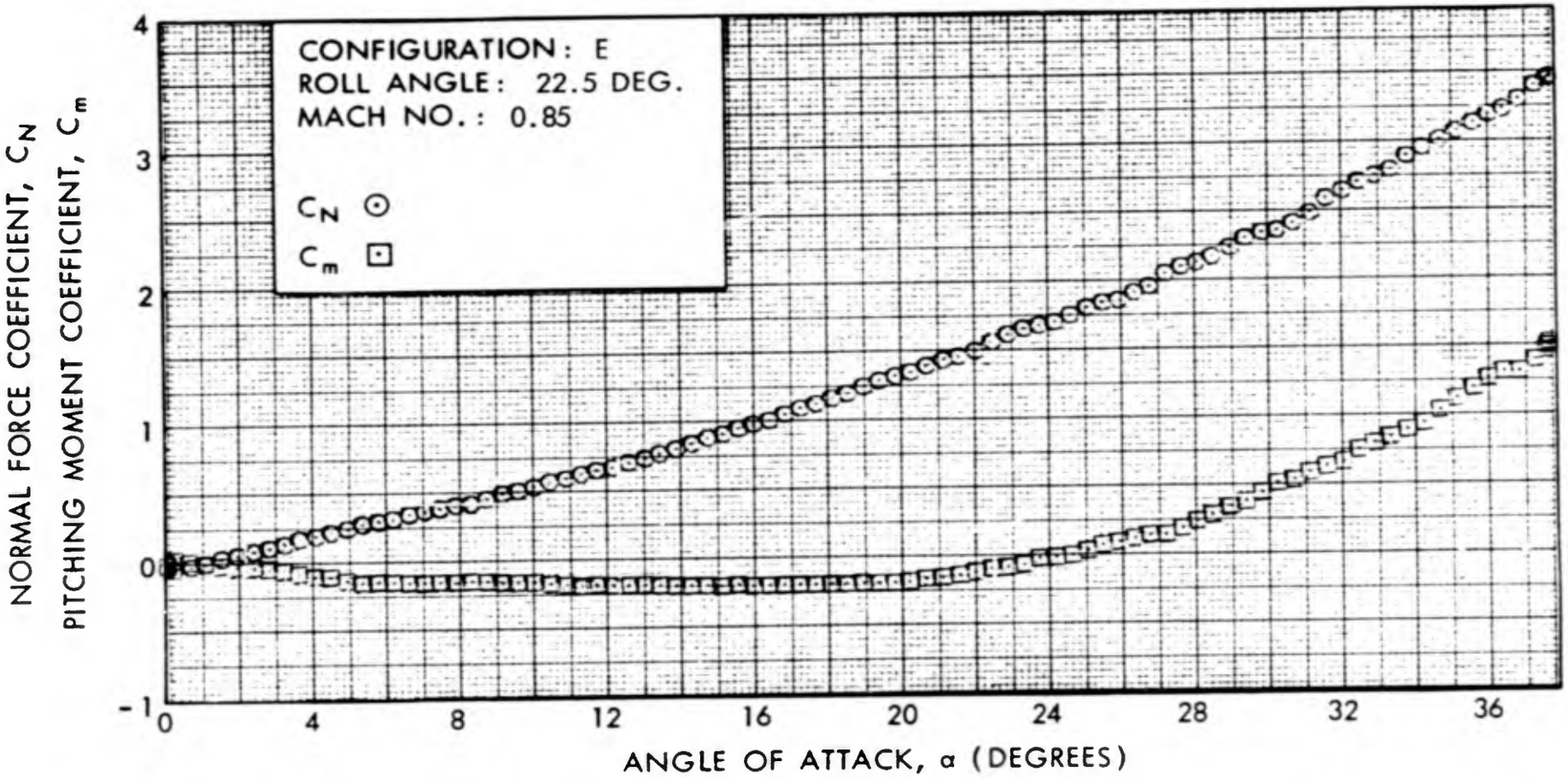
NOLTR 61-89

FIG. 43 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



NOLTR 61-89

FIG. 44 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



NOLTR 61-89

FIG. 45 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

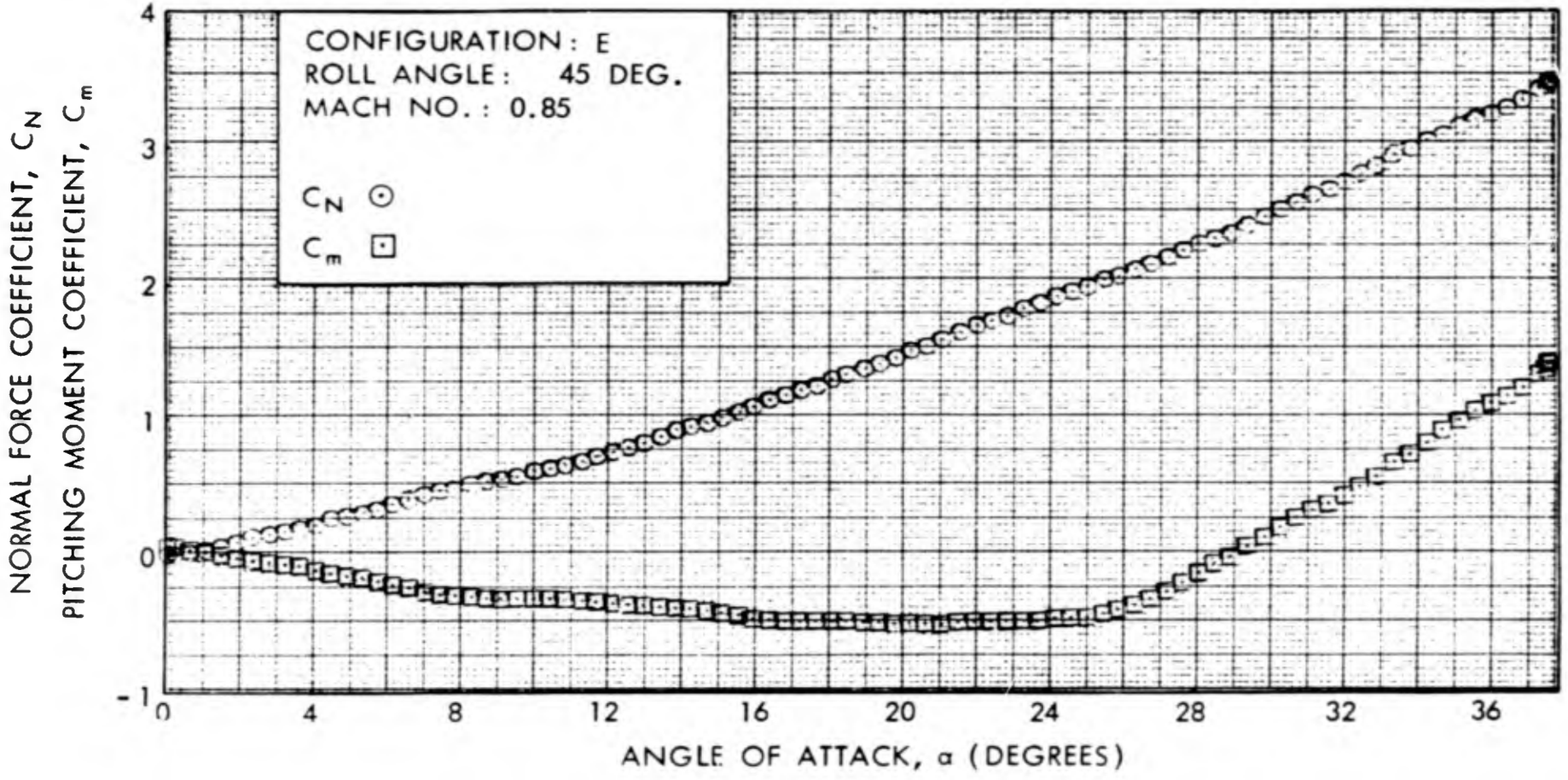


FIG. 46 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

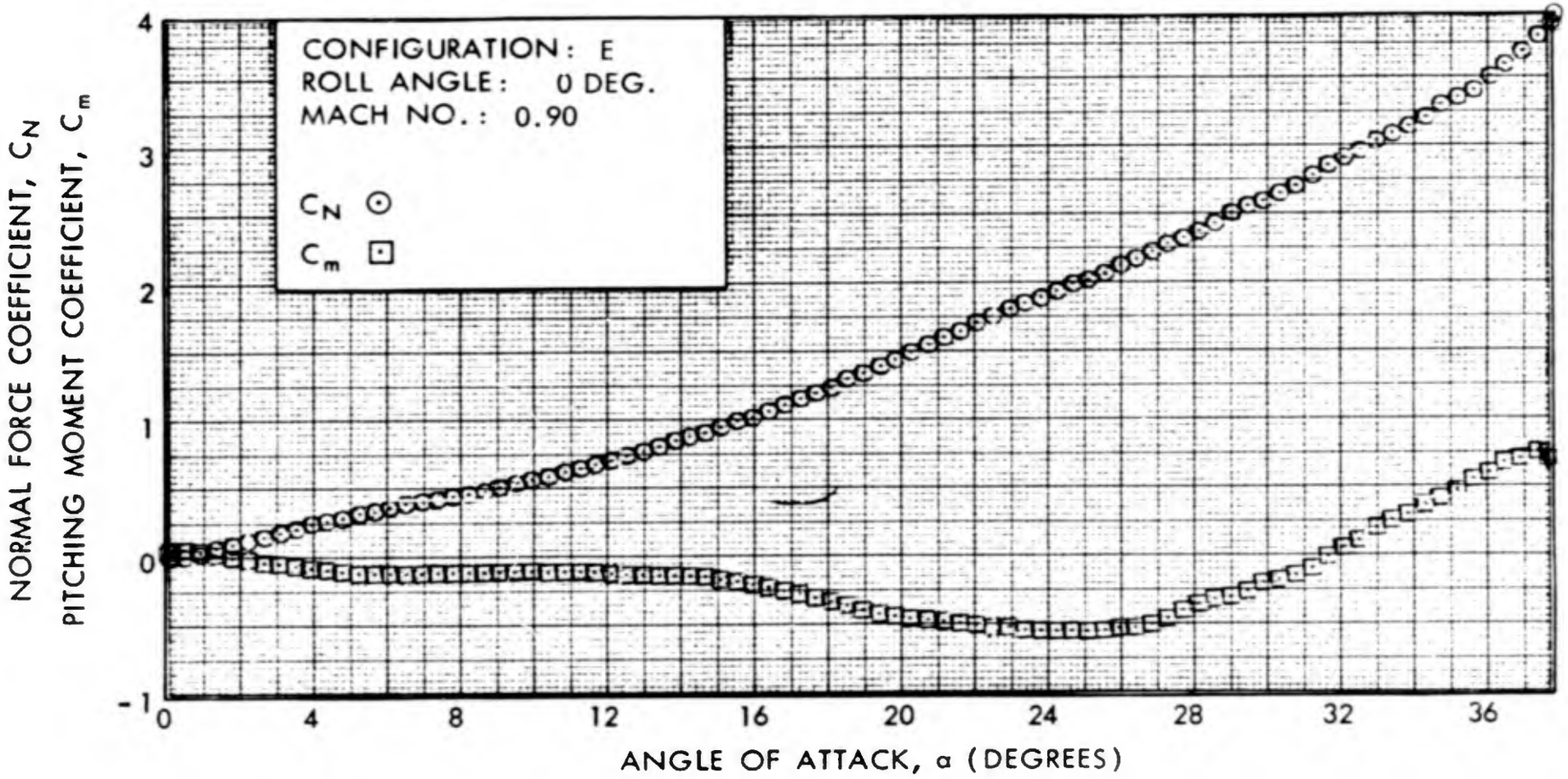


FIG. 47 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

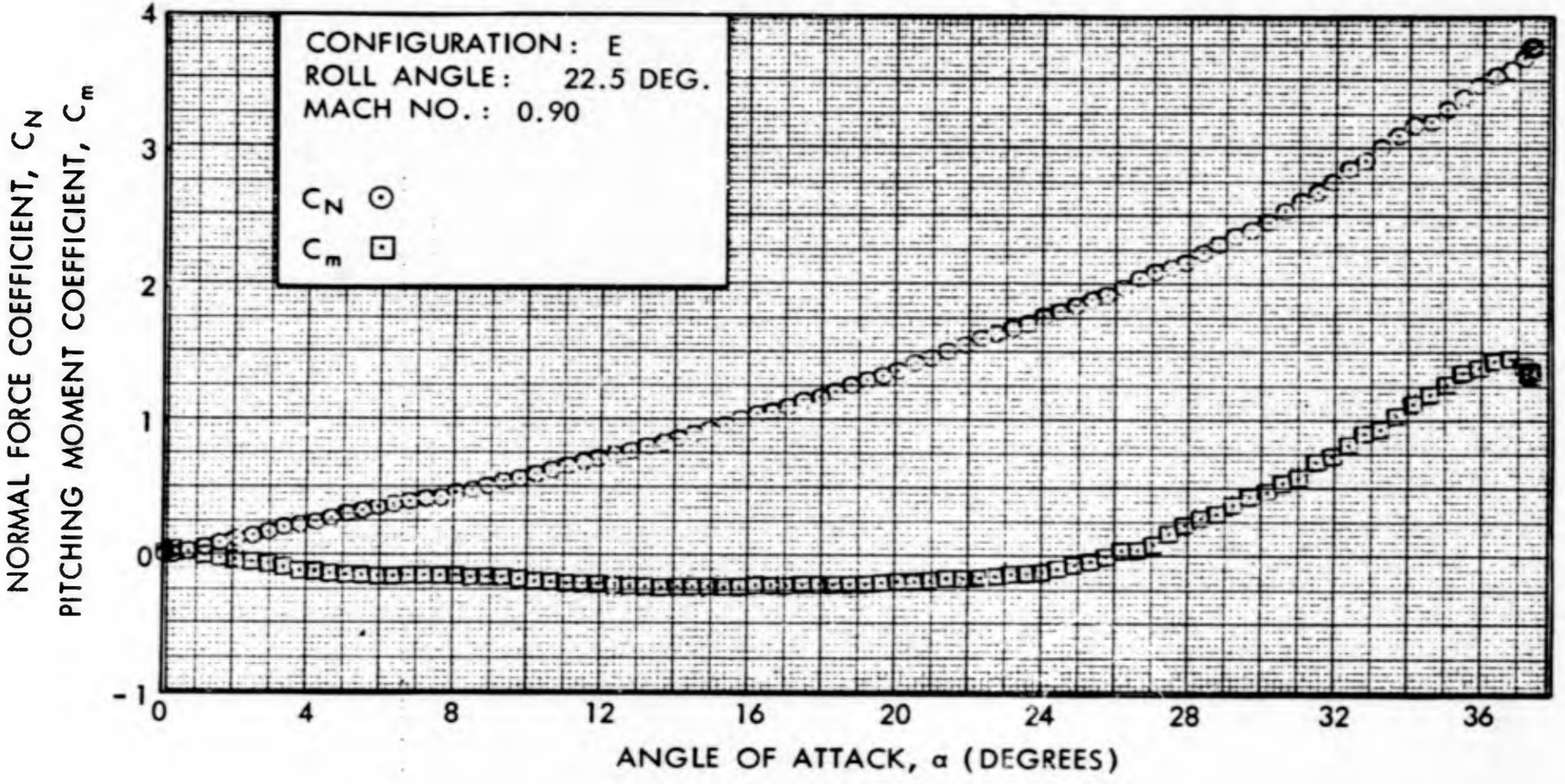


FIG. 48 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

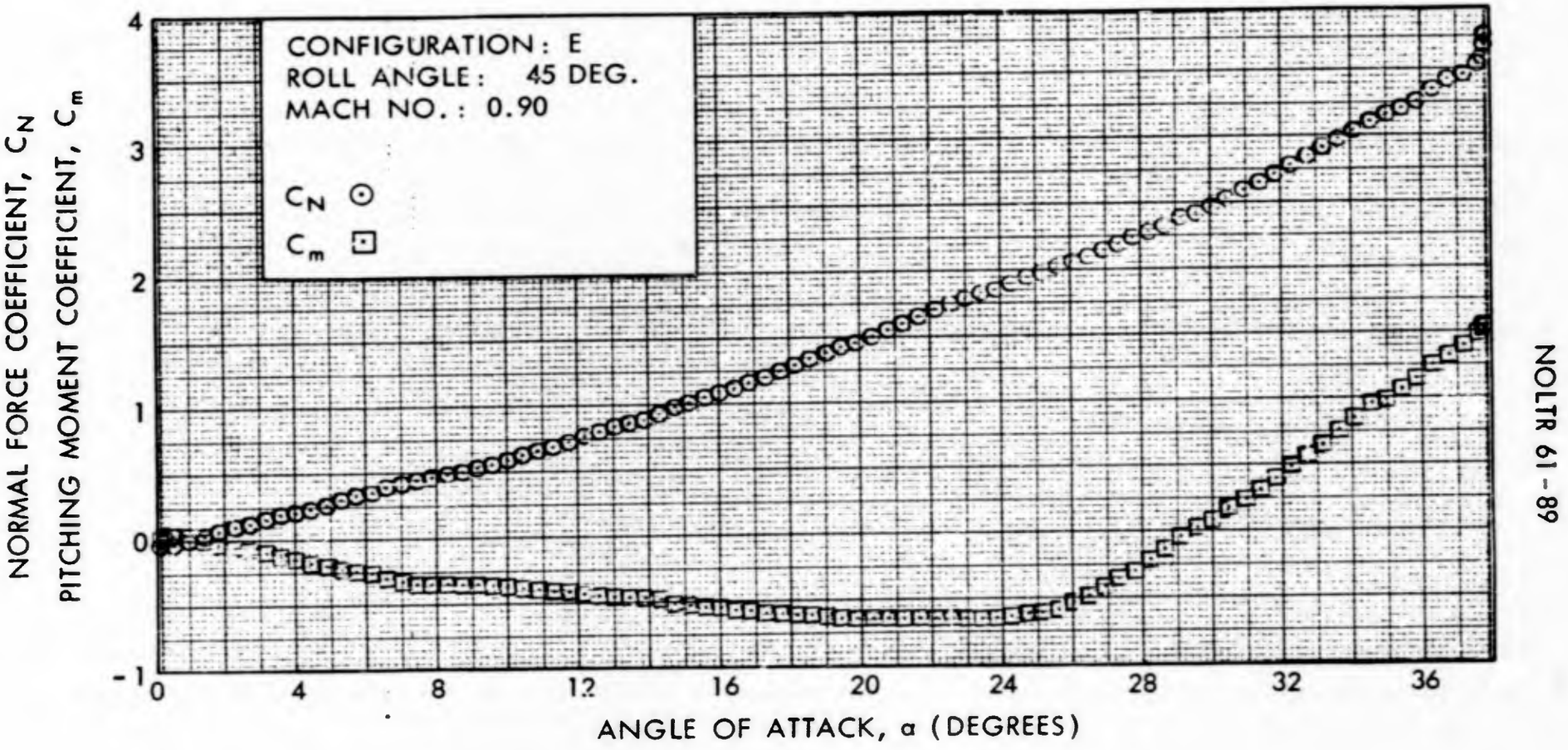
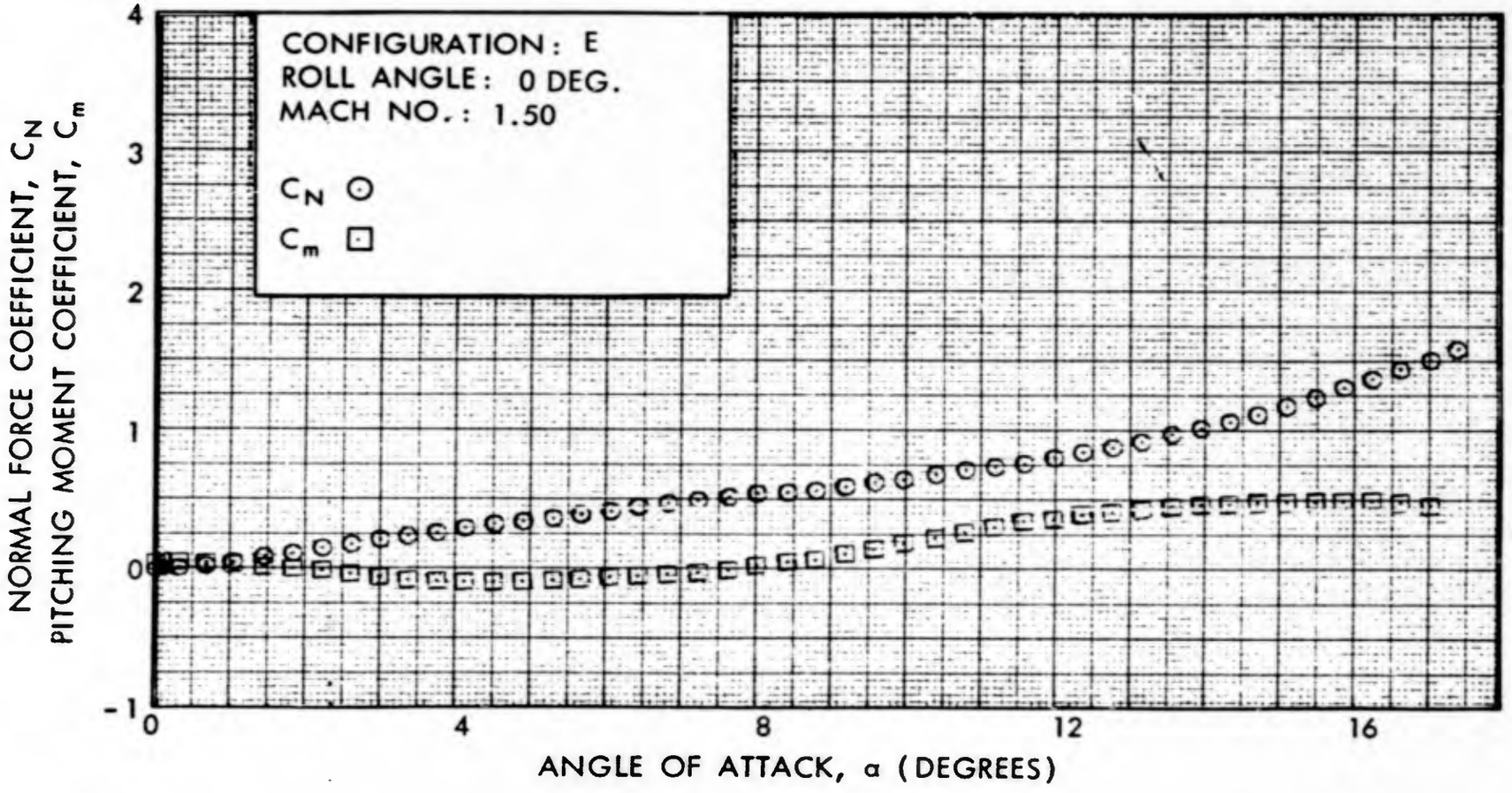
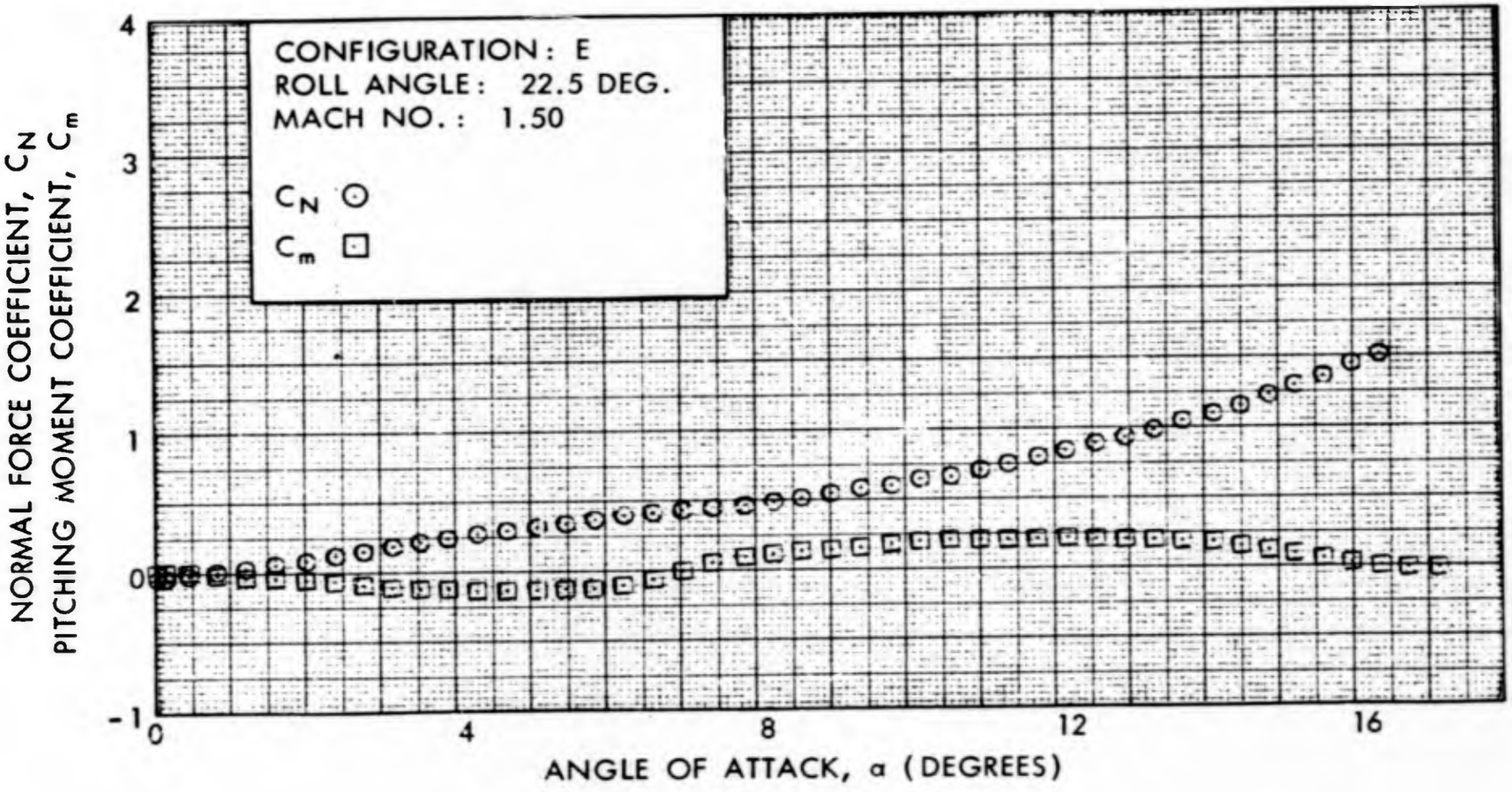


FIG. 49 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



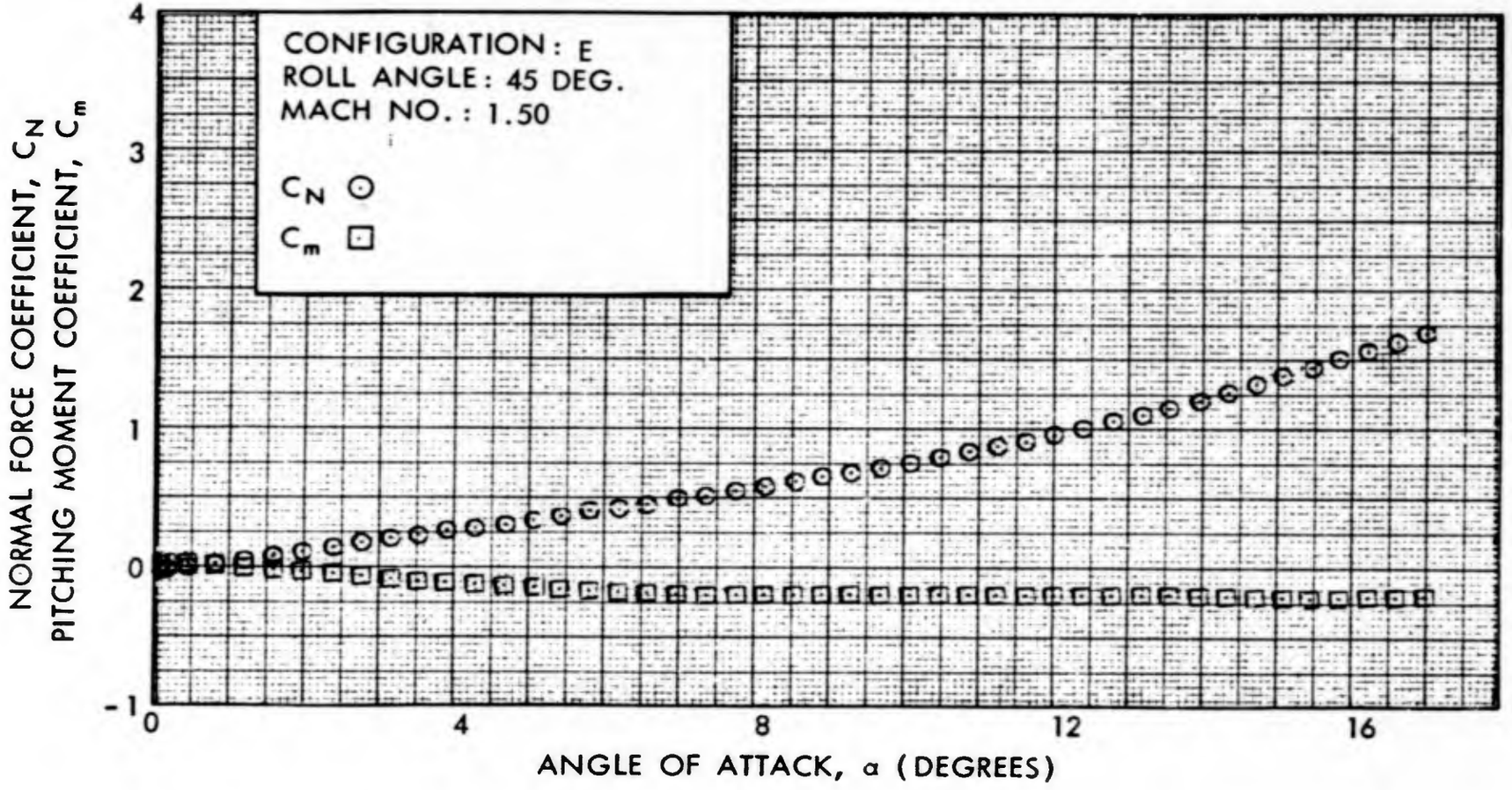
NOLTR 61-89

FIG. 50 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



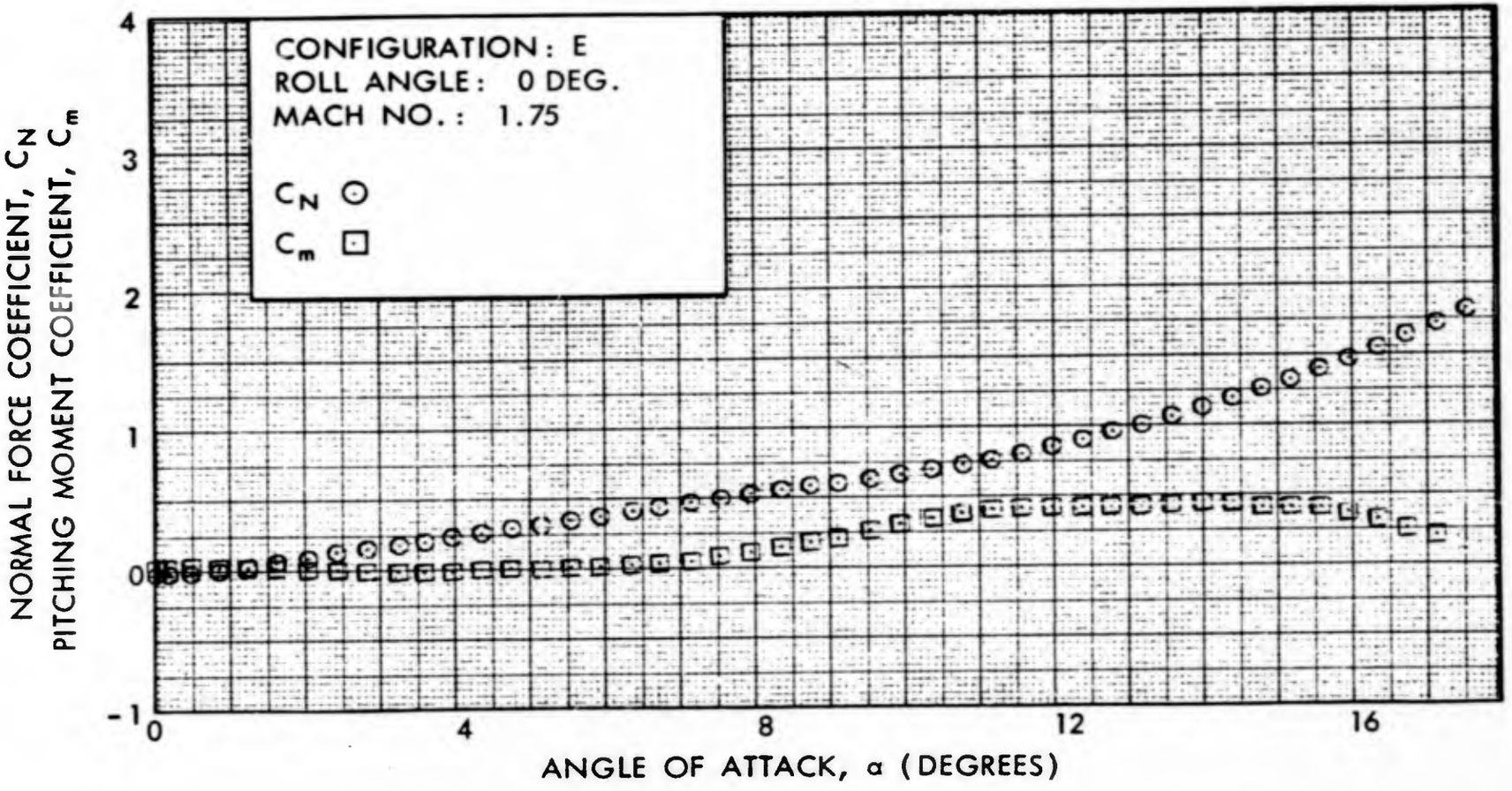
NOLTR 61-89

FIG. 51 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



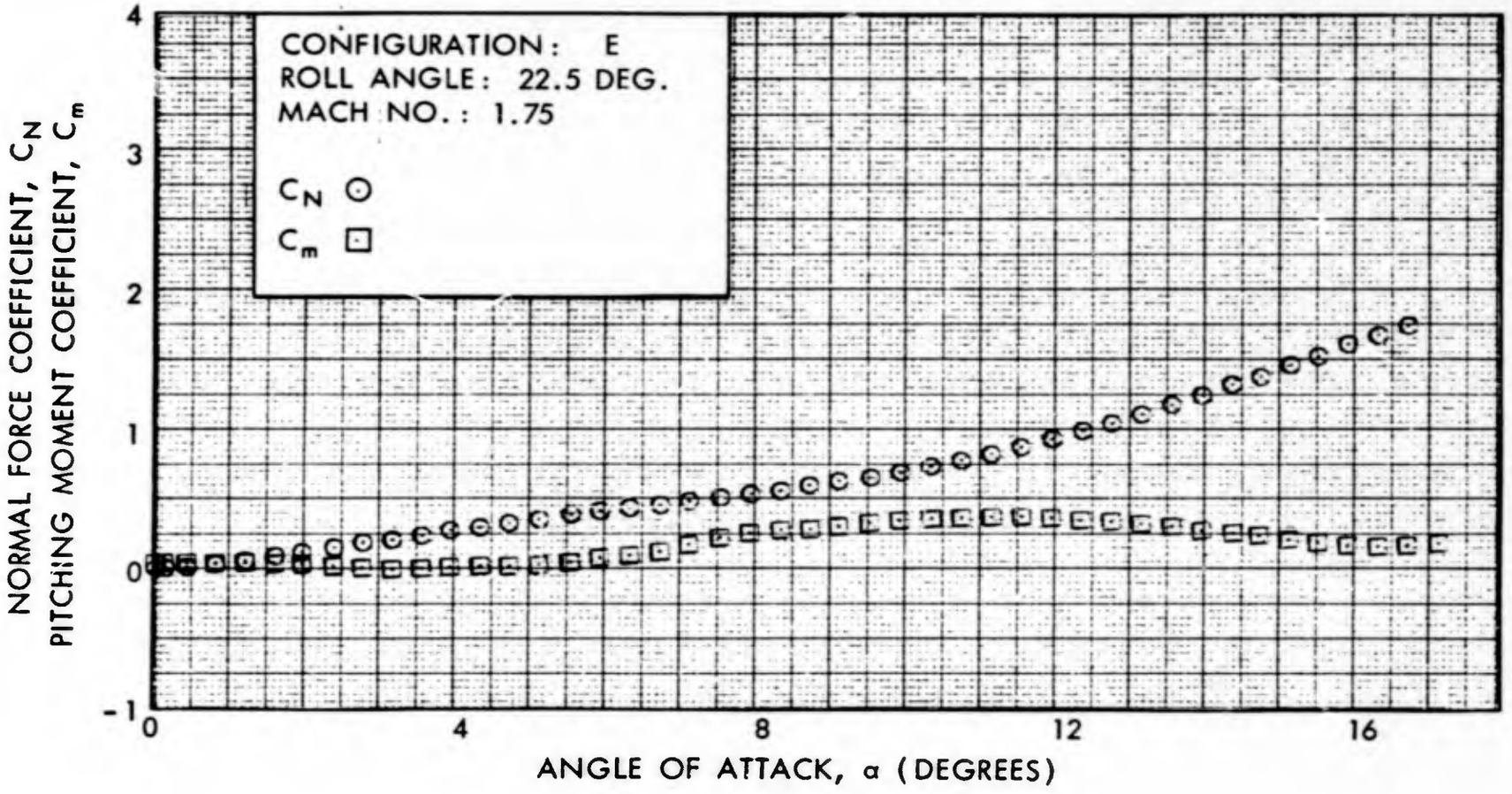
NOLTR 61-89

FIG. 52 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



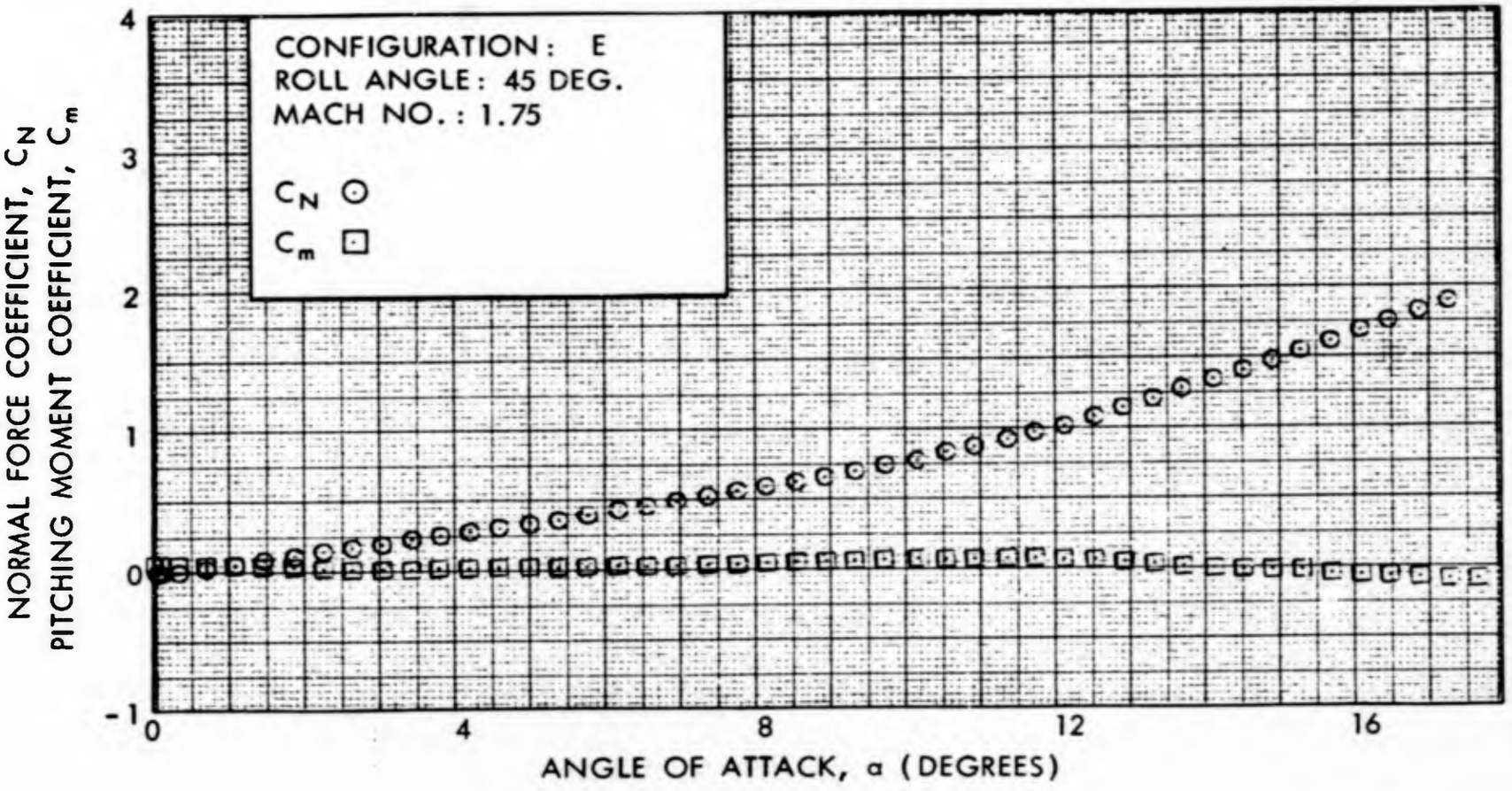
NOLTR 61-89

FIG. 53 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



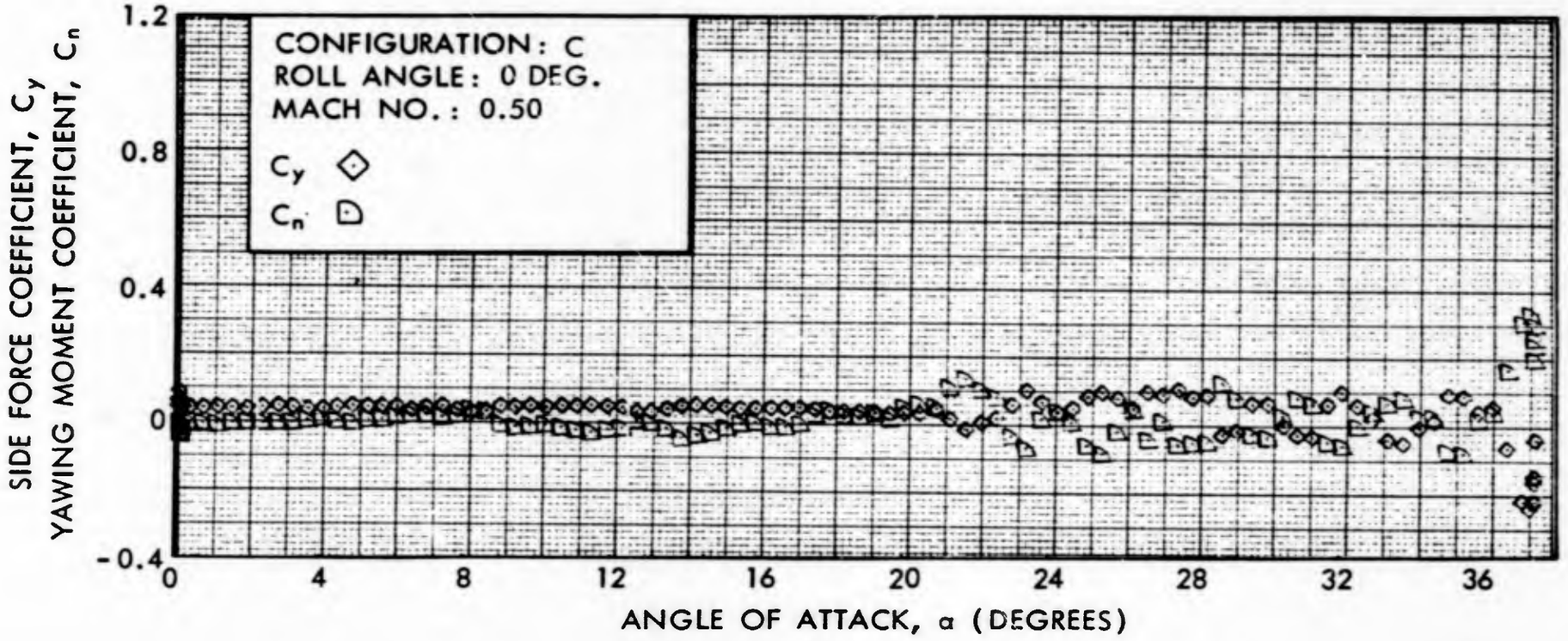
NOLTR 61-89

FIG. 54 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



NOLTR 61-89

FIG. 55 NORMAL FORCE COEFFICIENT AND PITCHING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



NOLTR 61-89

FIG. 56 . SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

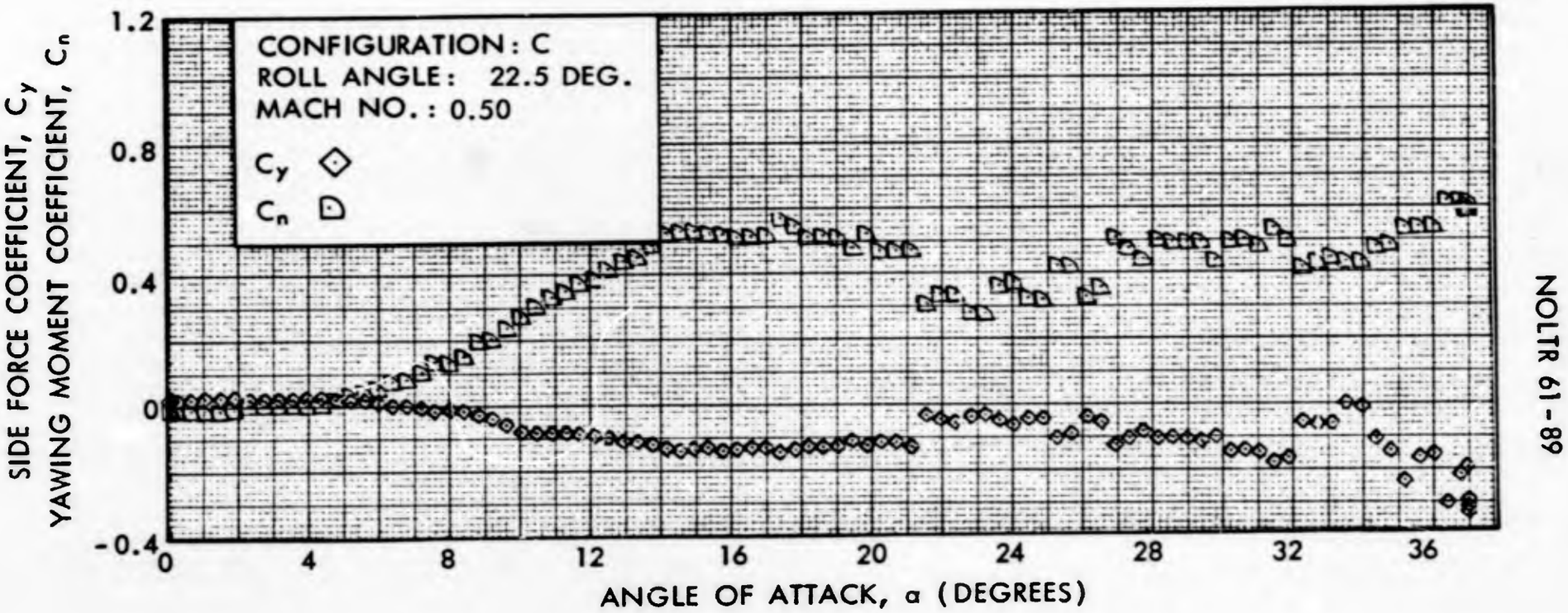


FIG. 57 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

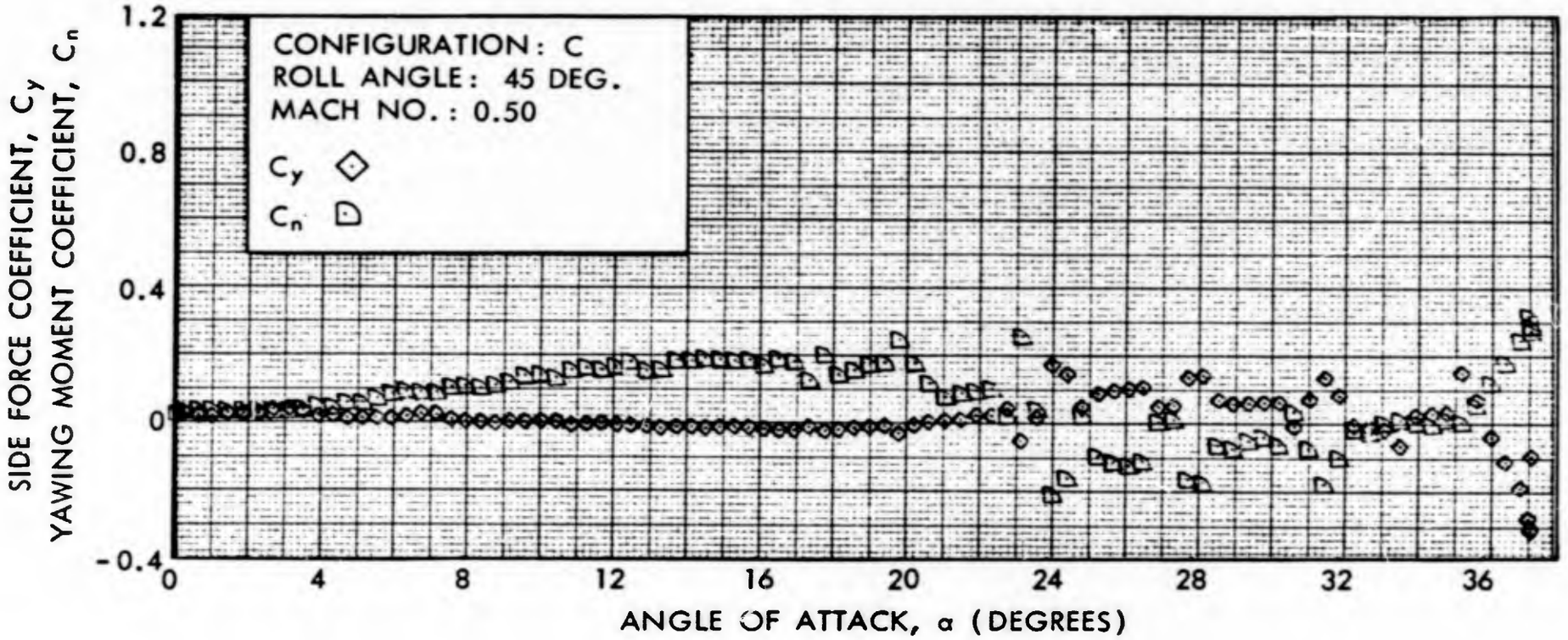


FIG. 58 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

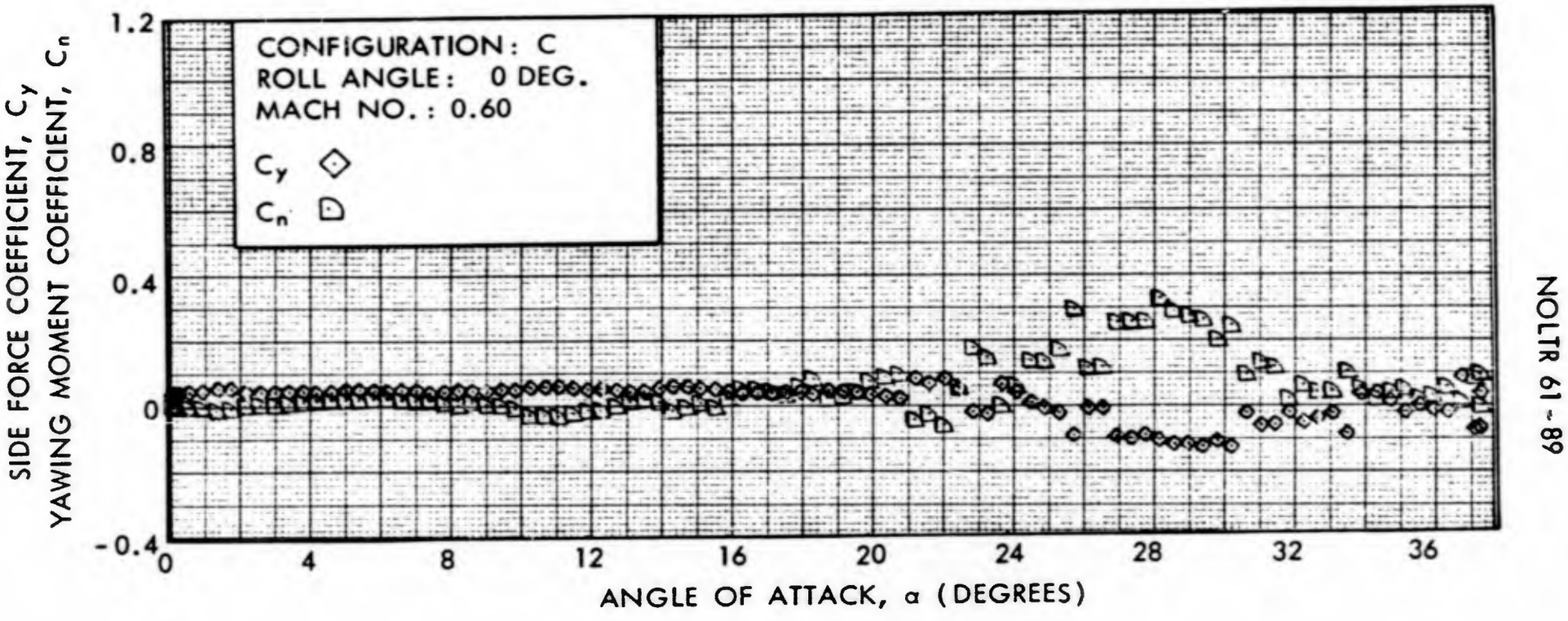


FIG. 59 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

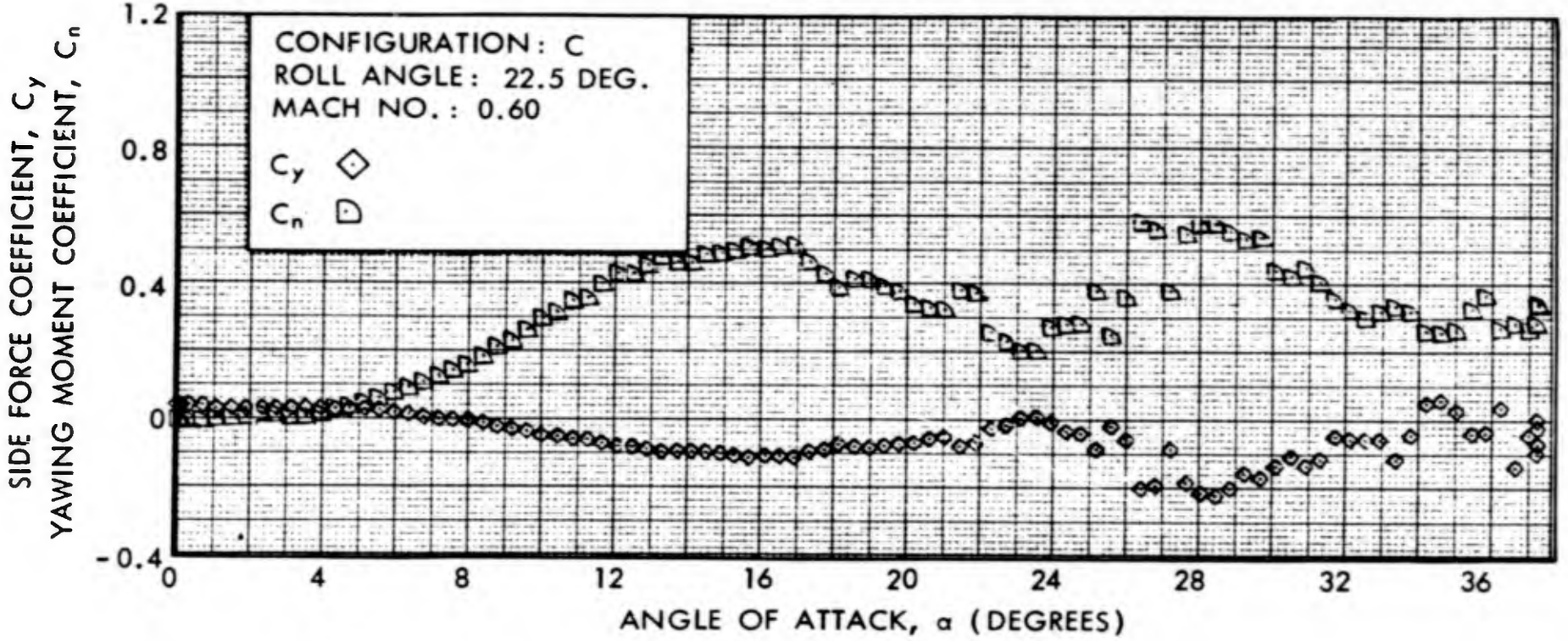


FIG. 60 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

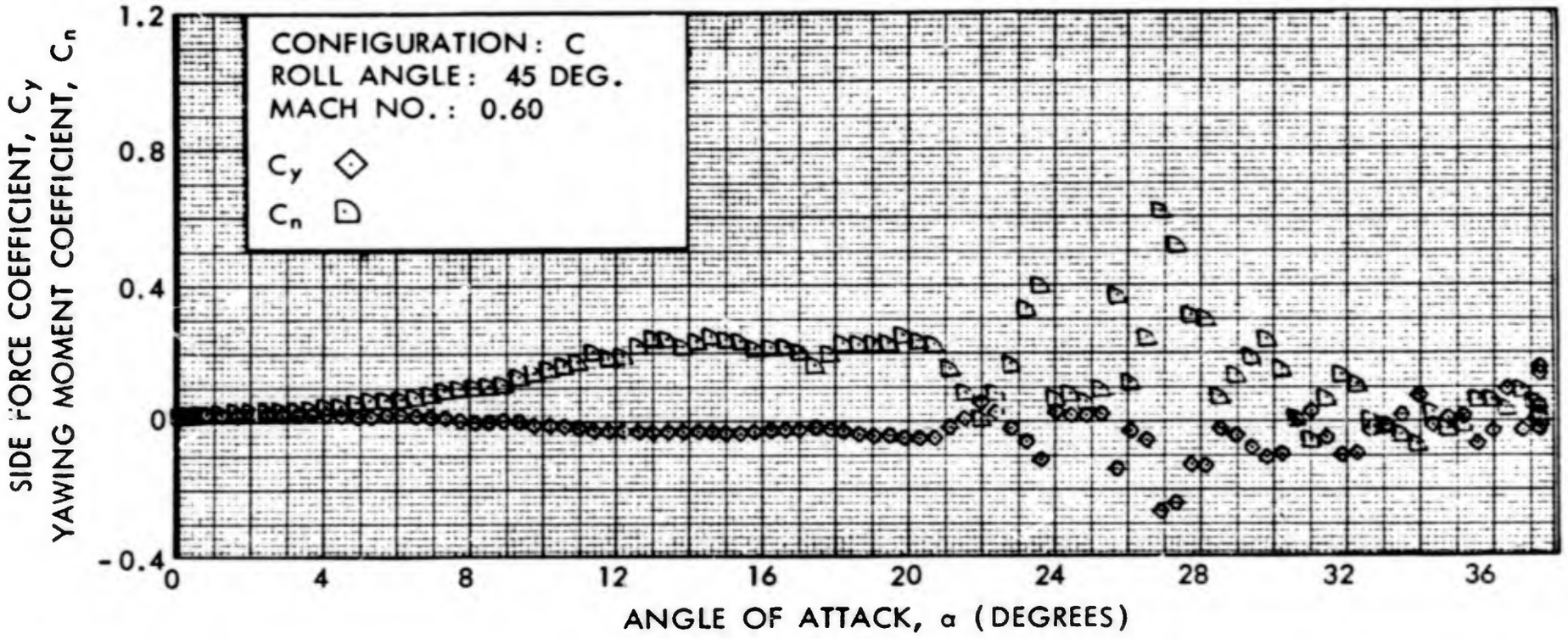


FIG. 61 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

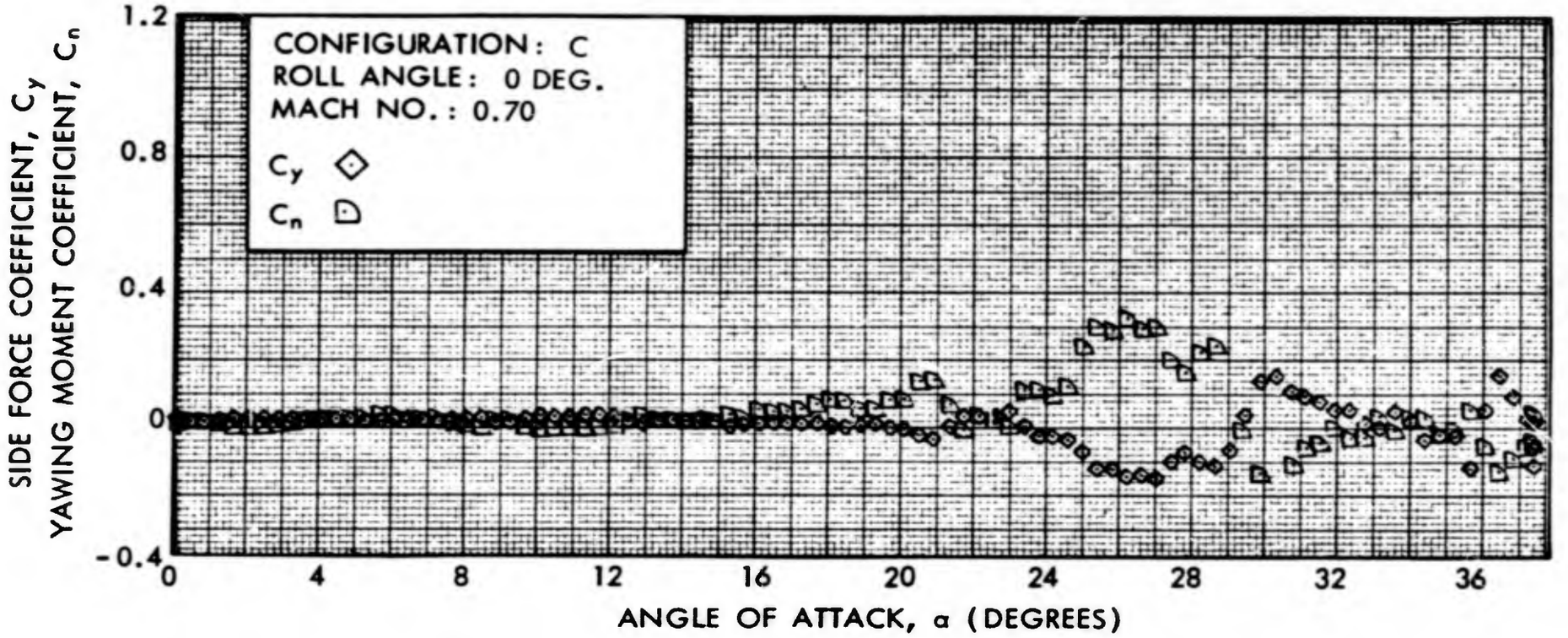


FIG. 62 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

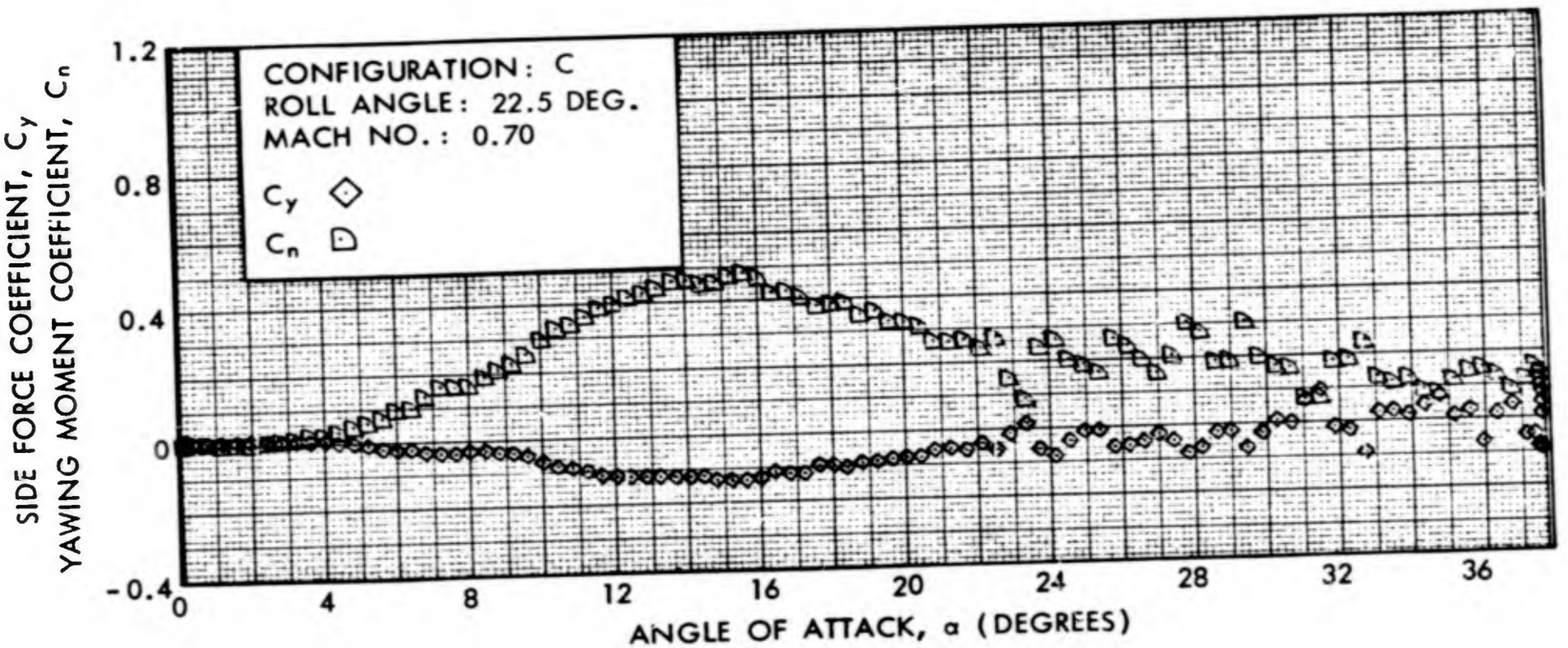
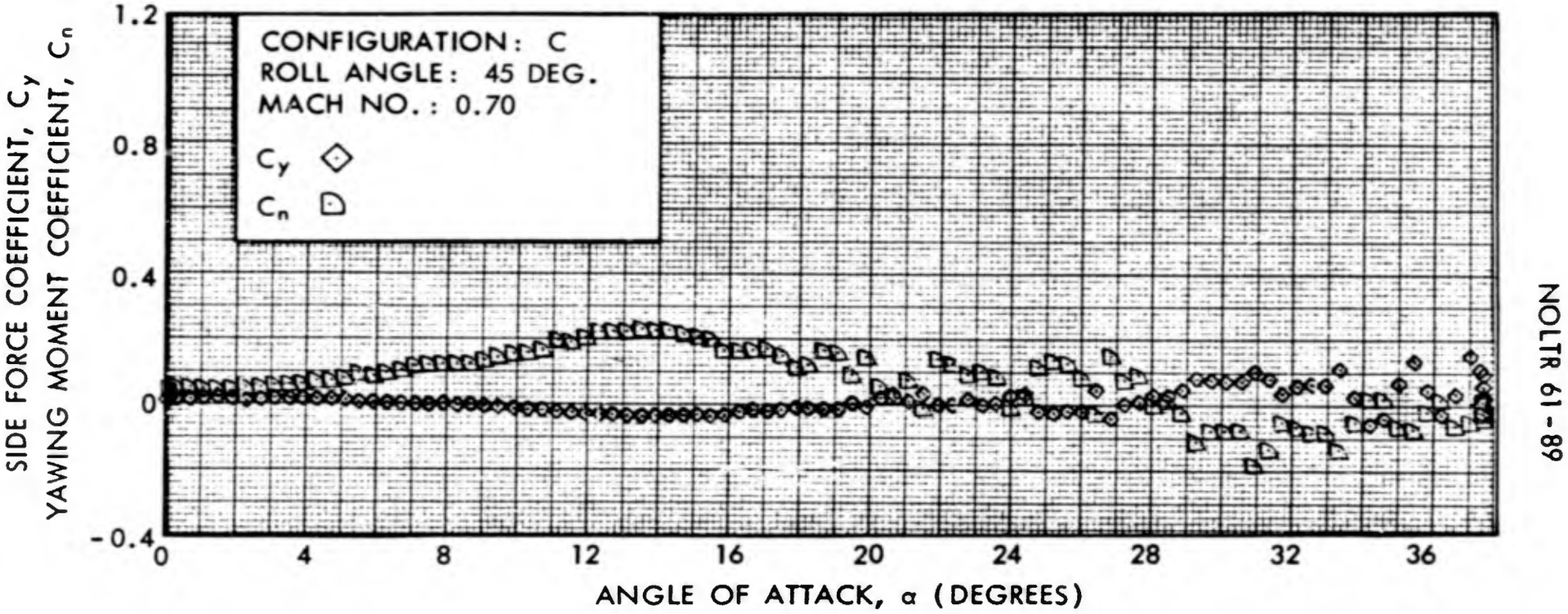


FIG. 63 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



NOLTR 61-89

FIG. 64 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

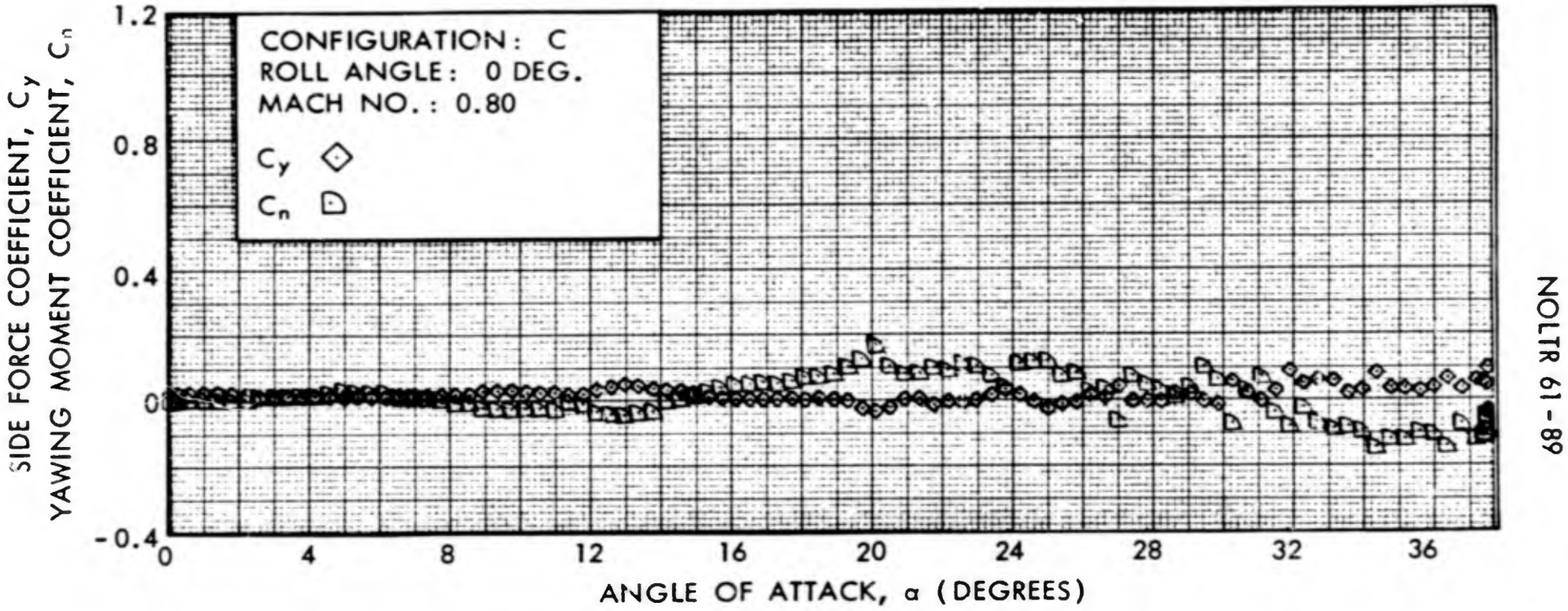


FIG. 65 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

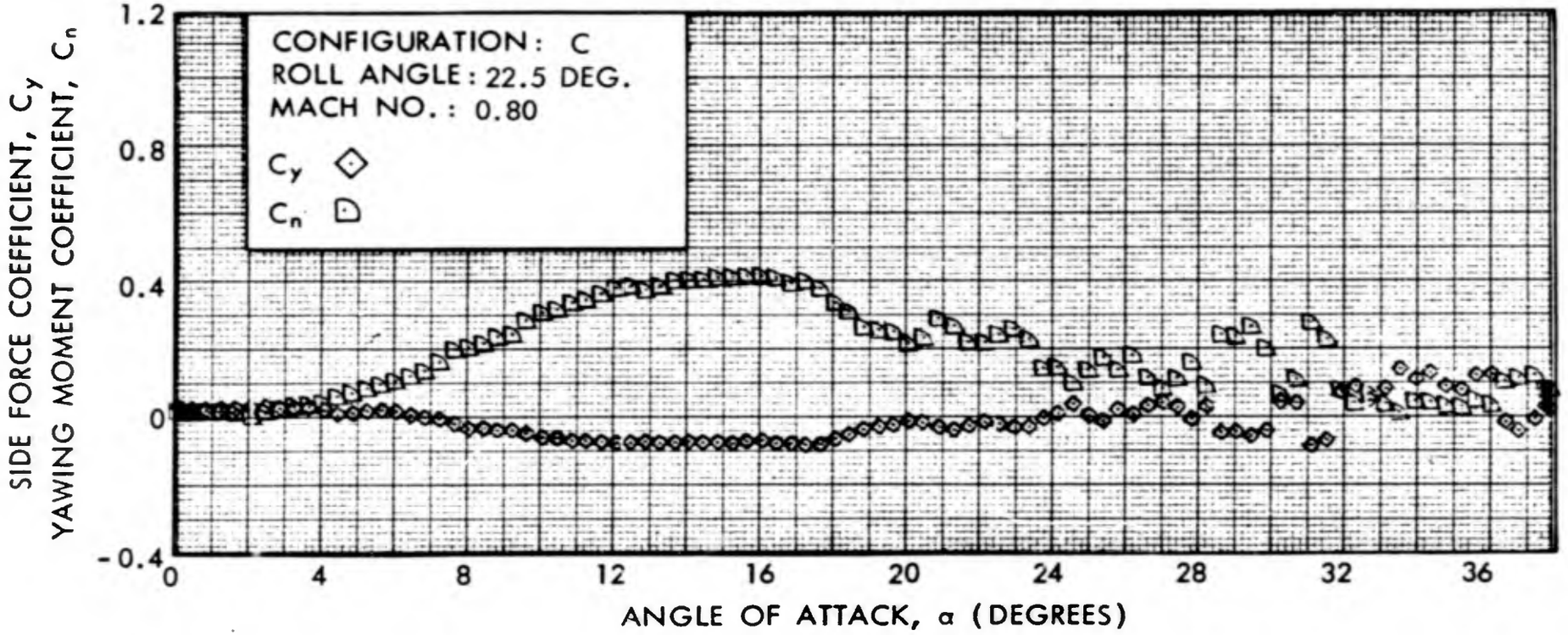


FIG. 66 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

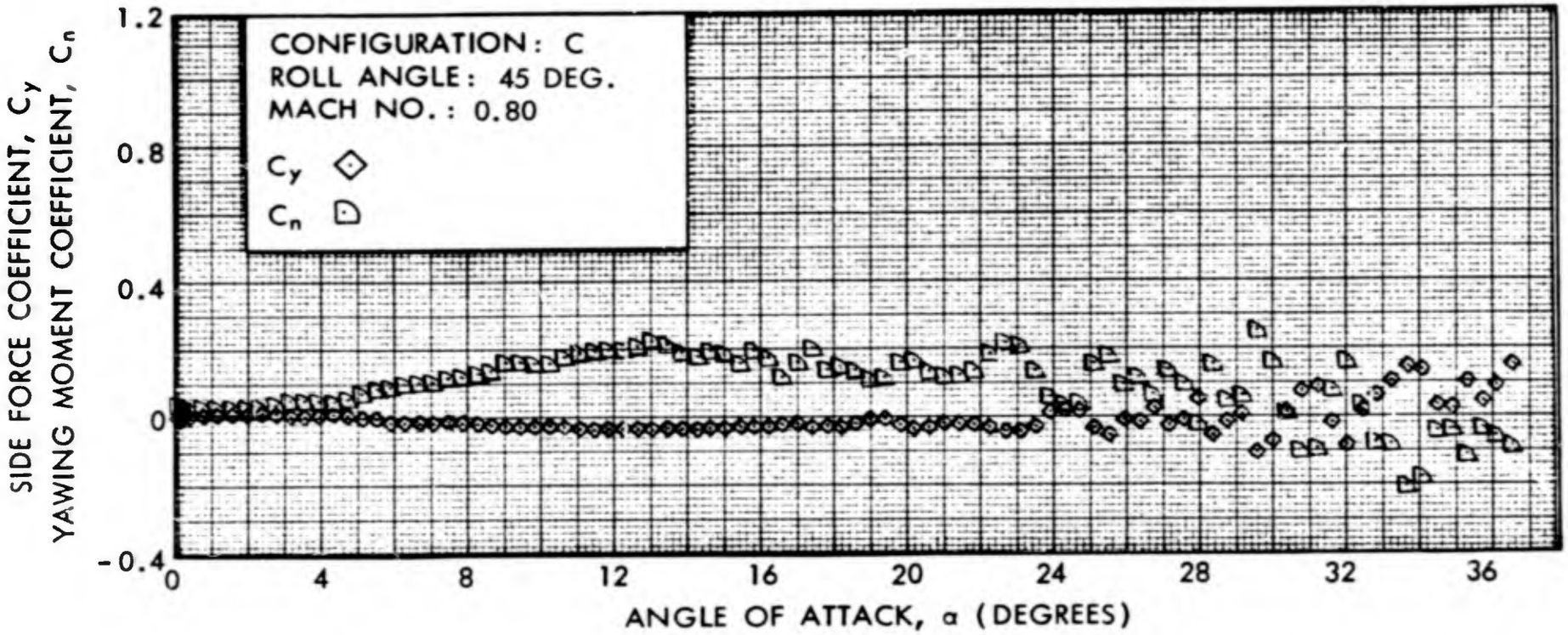
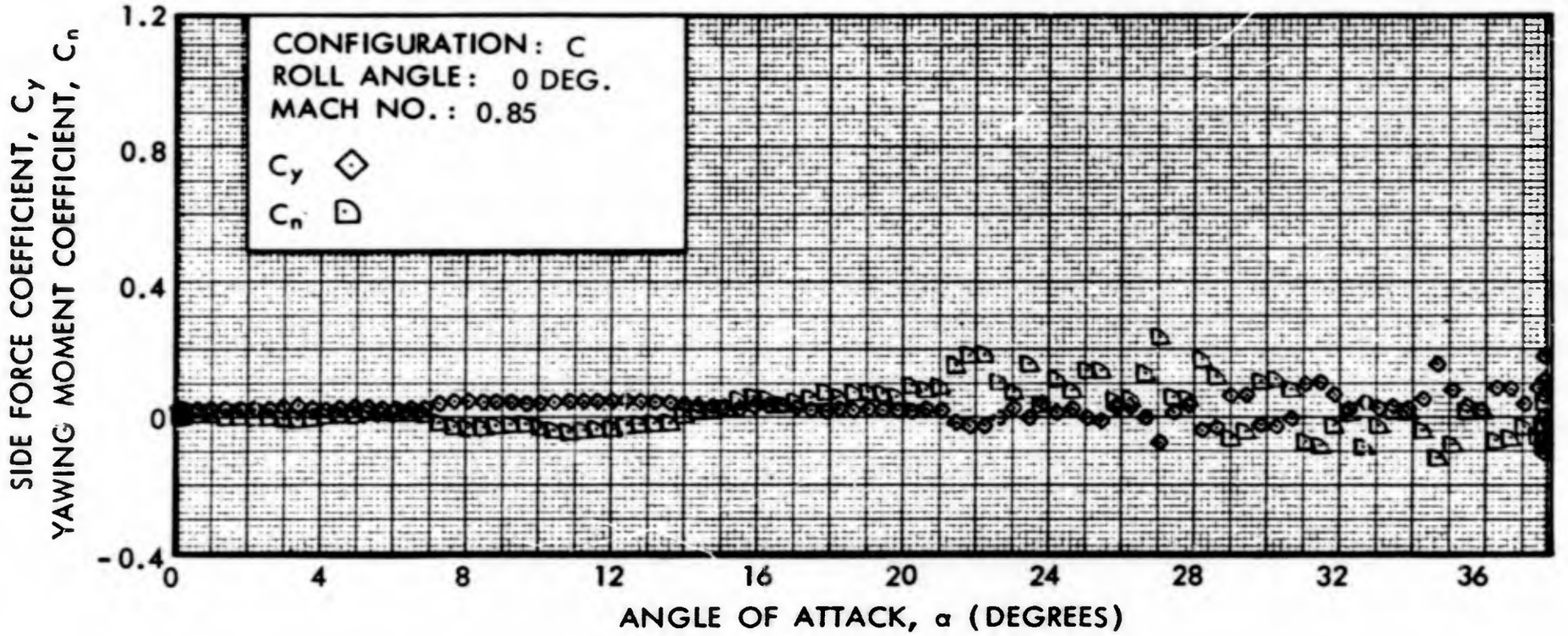


FIG. 67 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



NOLR 64-89

FIG. 68 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

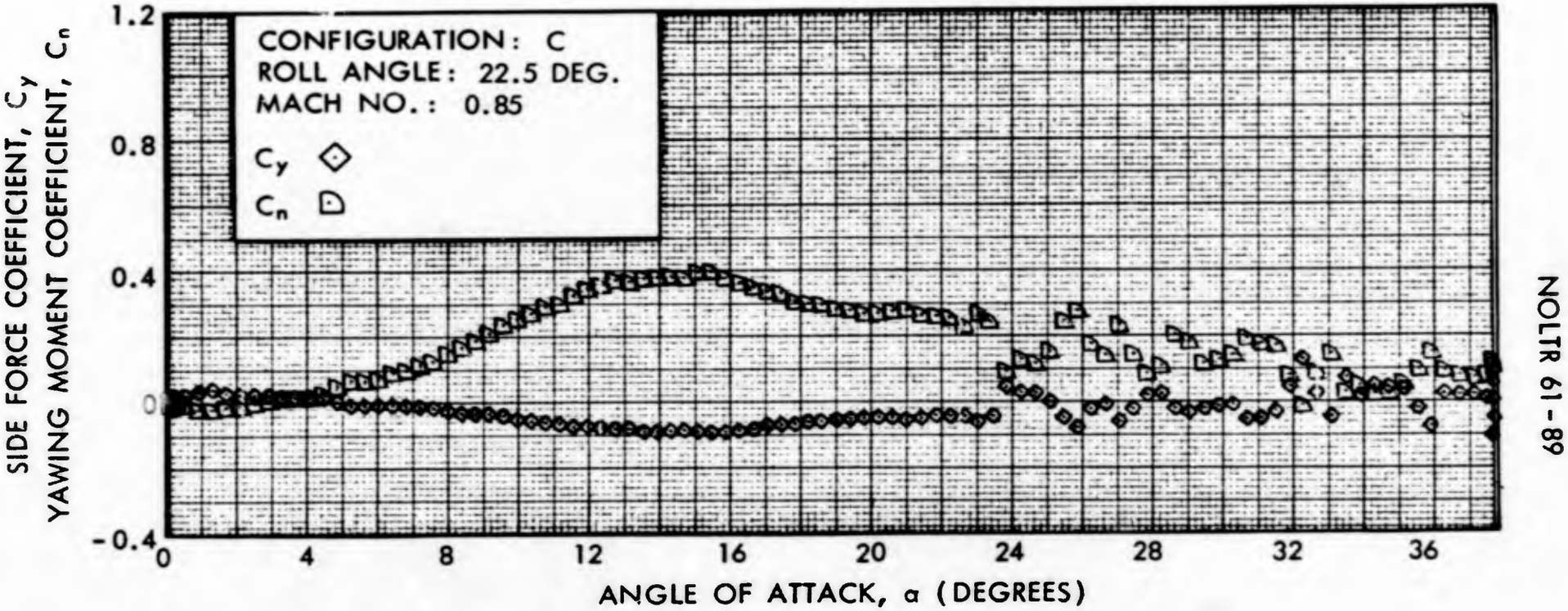


FIG. 69 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

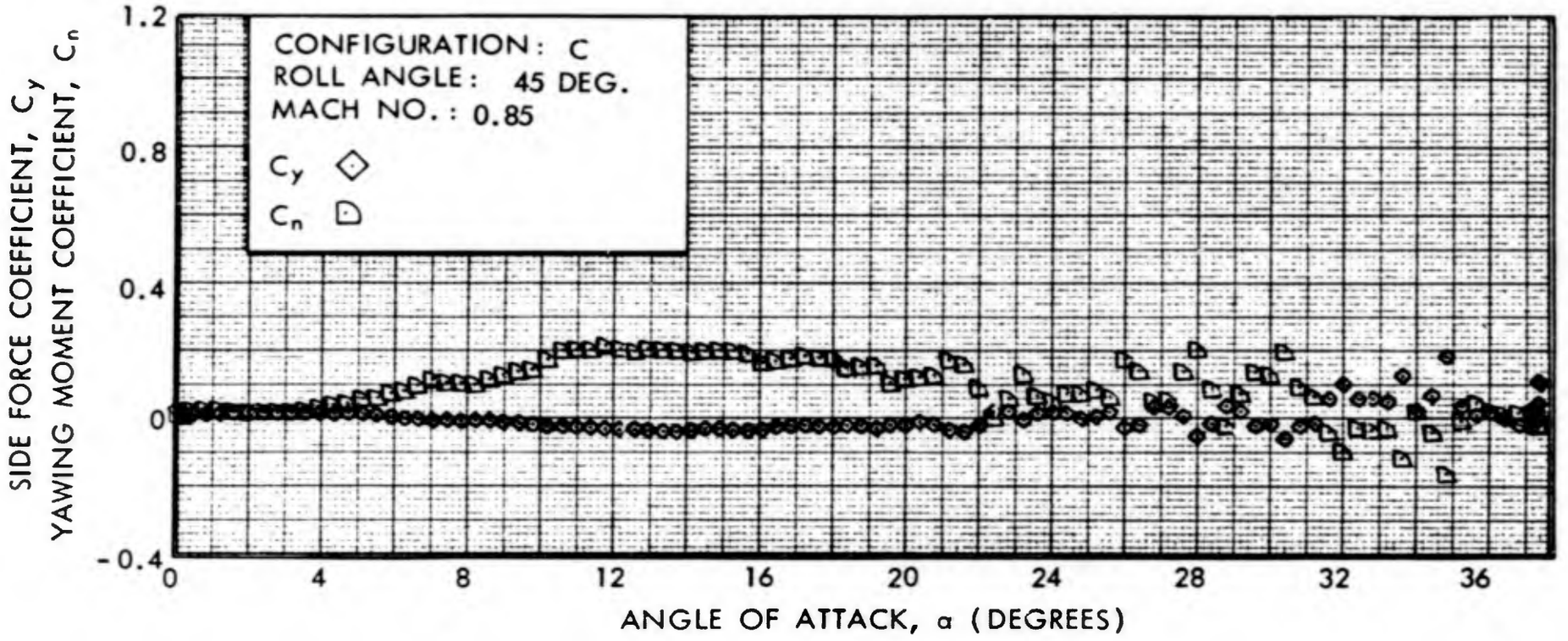


FIG. 70 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

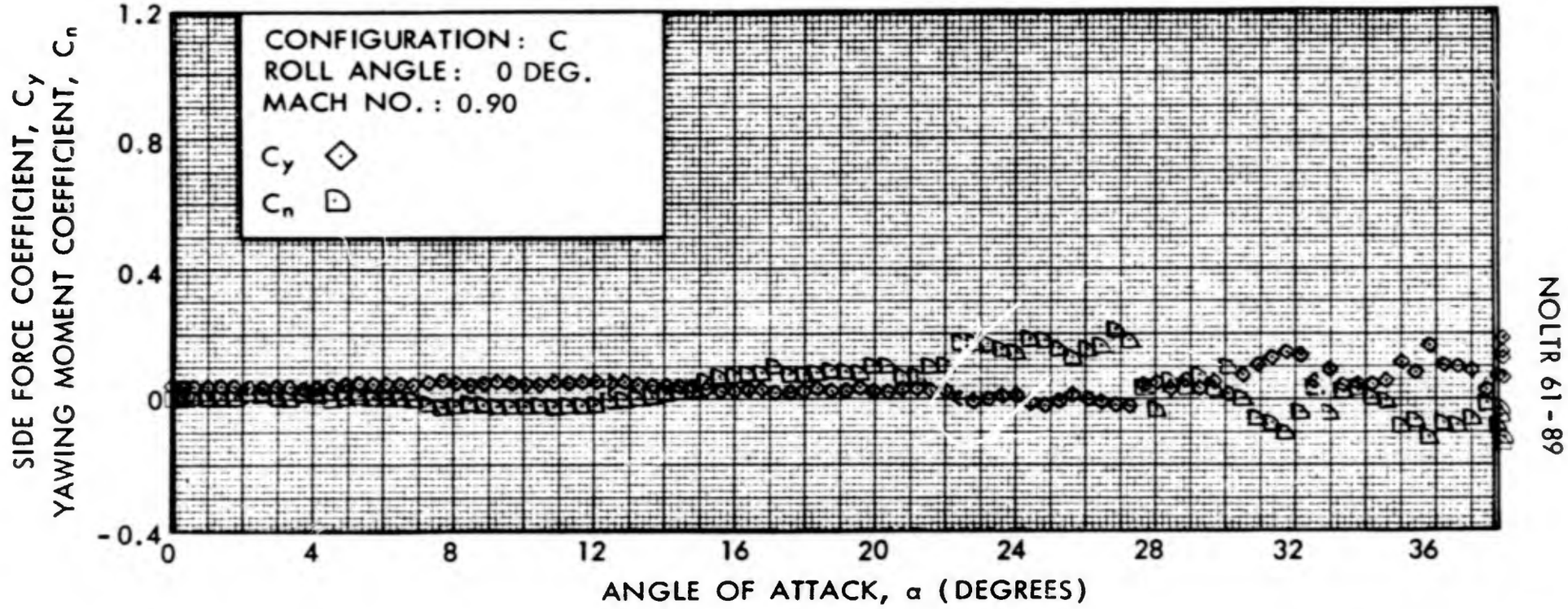


FIG. 71 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

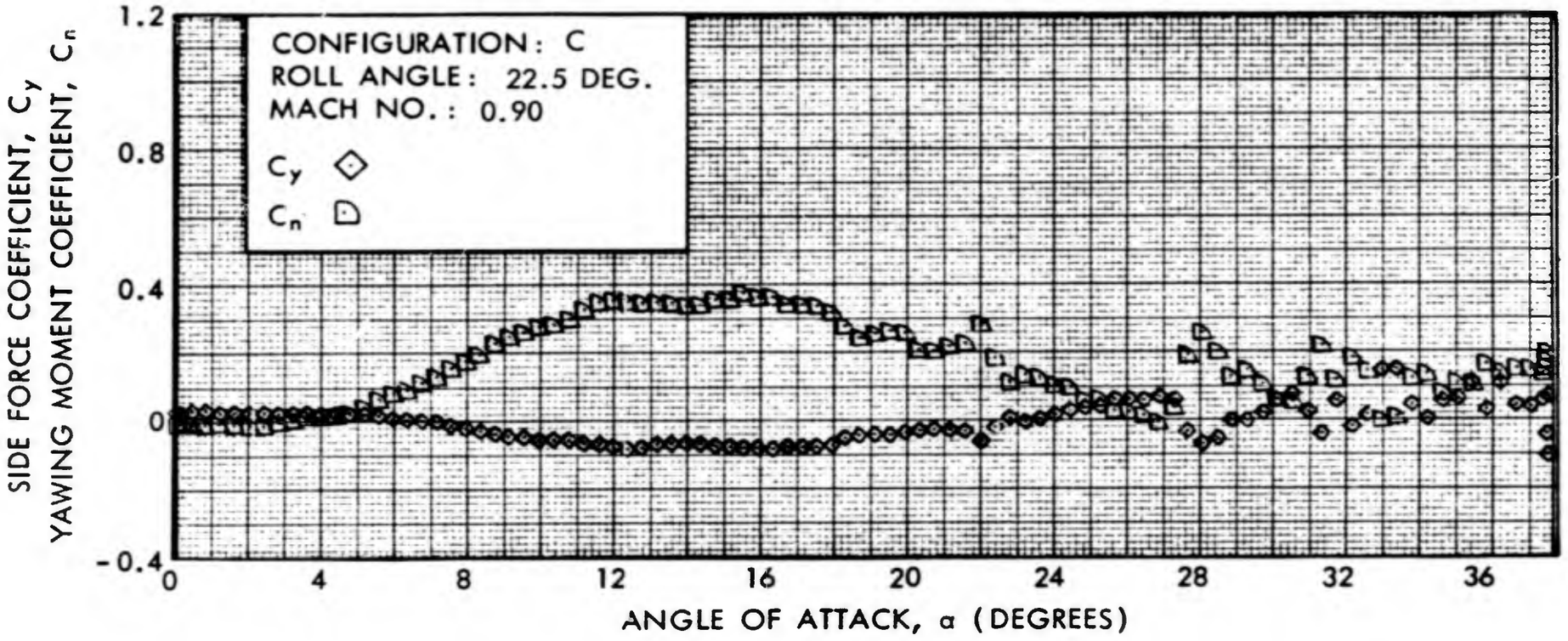


FIG. 72 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

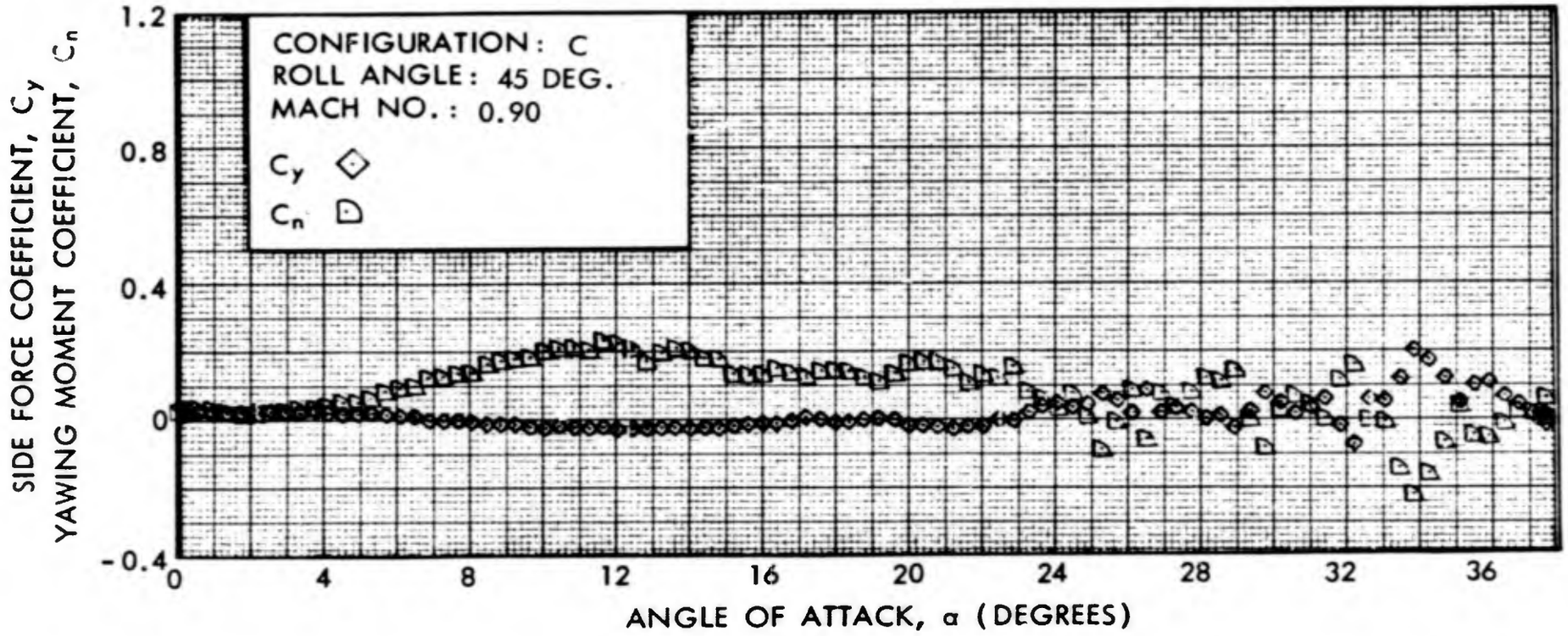


FIG. 73 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

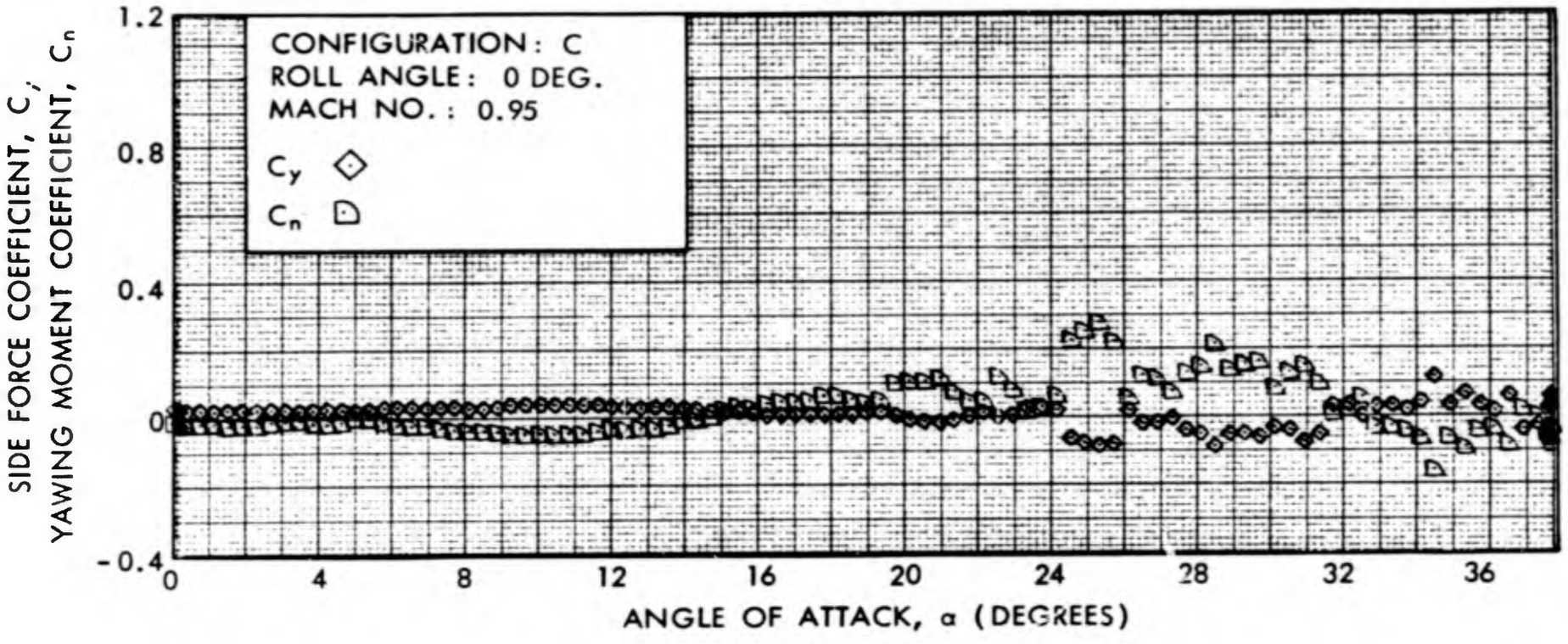


FIG. 74 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

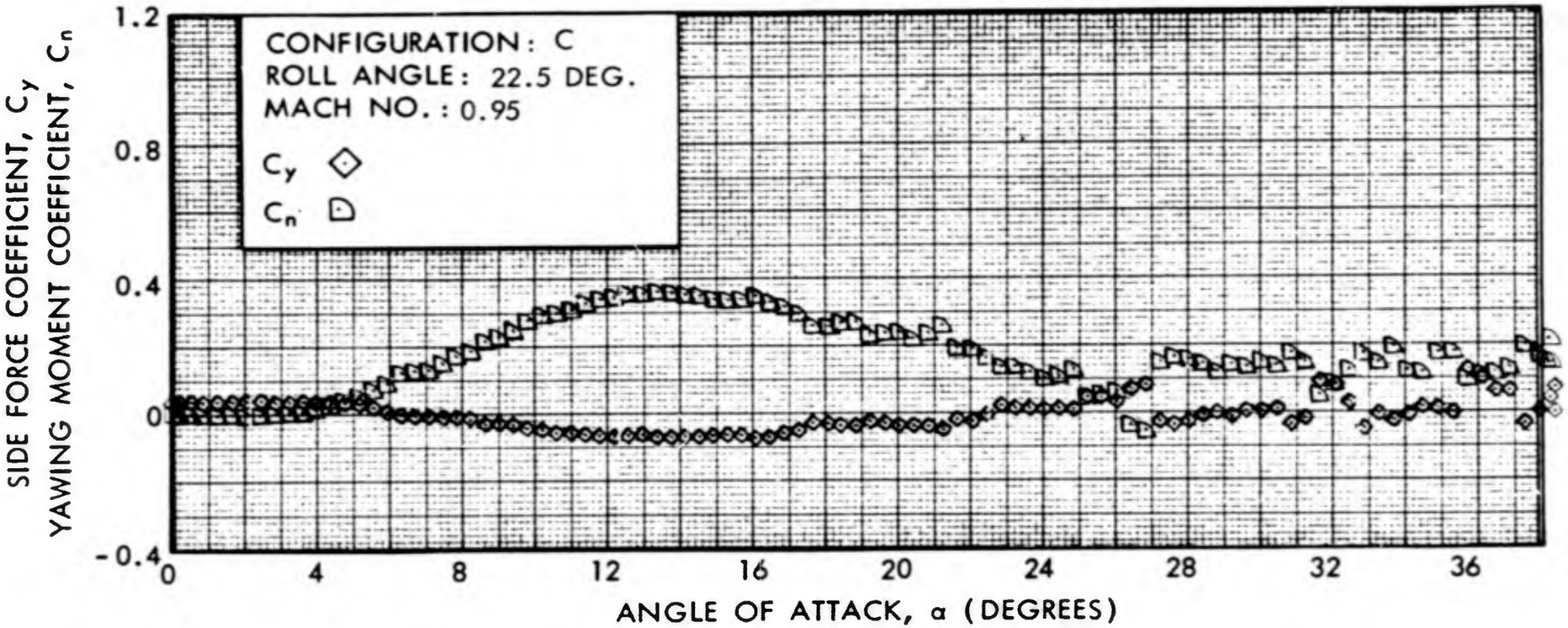


FIG. 75 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

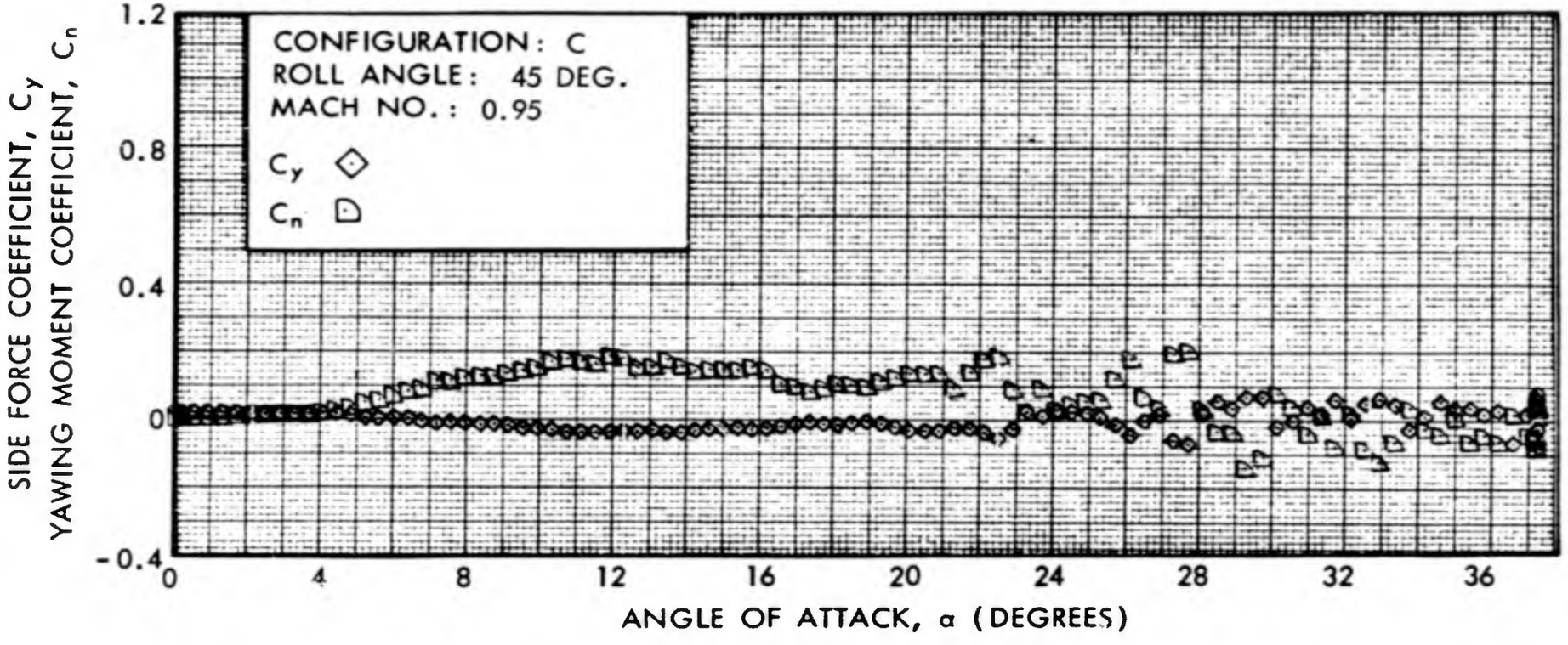


FIG. 76 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

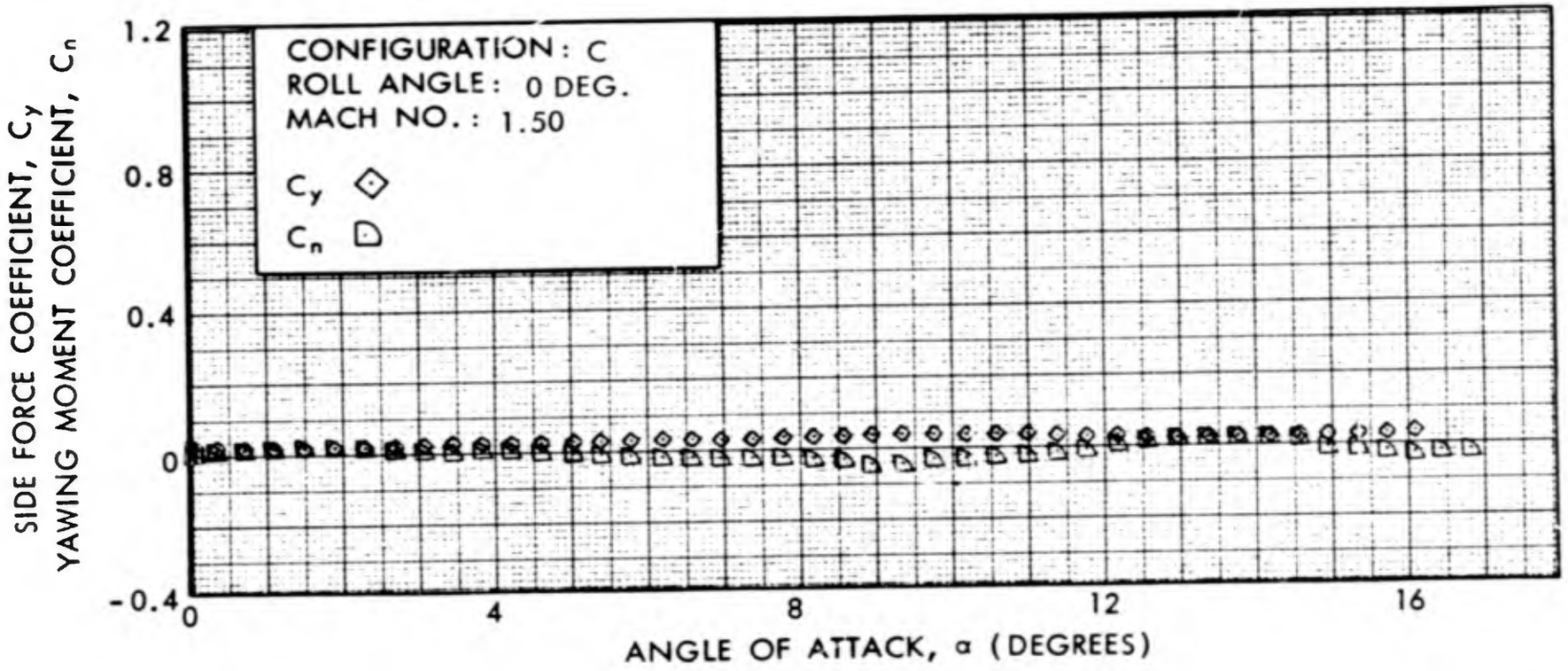
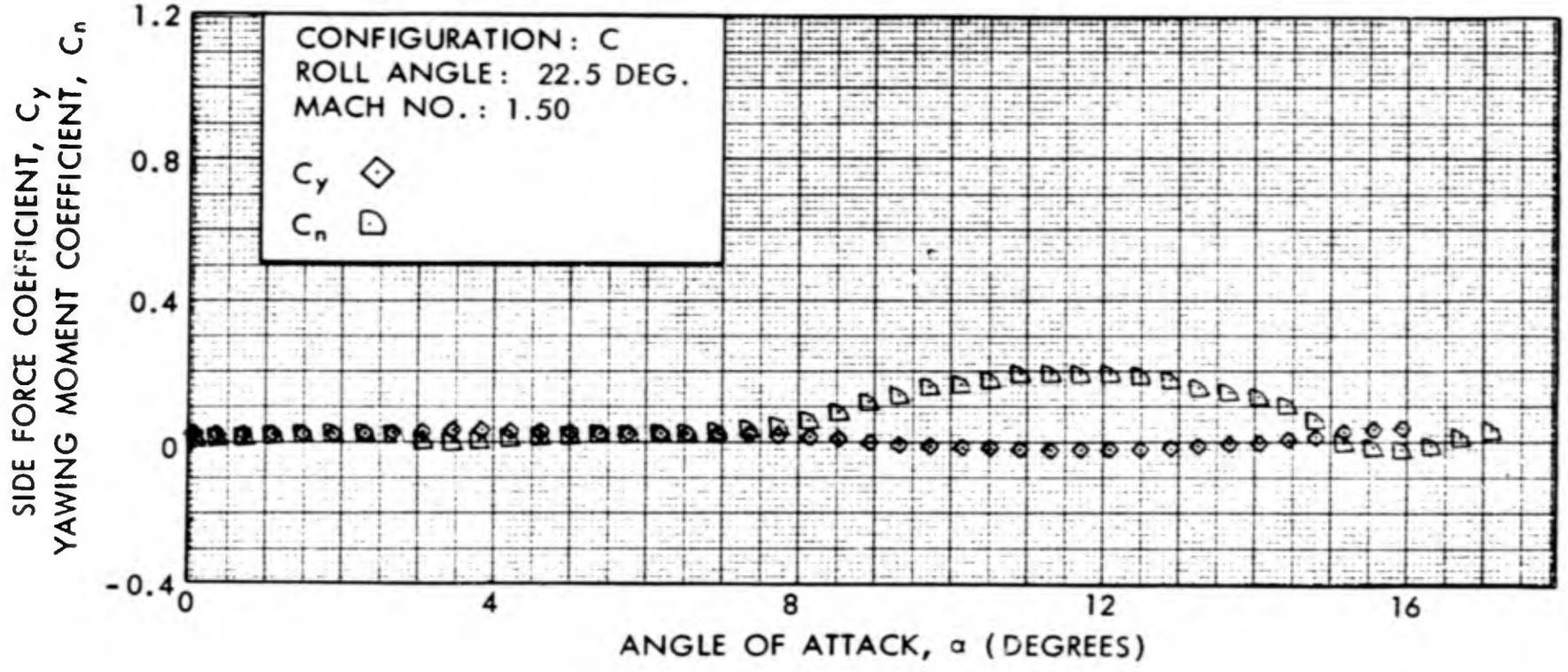


FIG. 77 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



NOLTR 61-89

FIG. 78 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

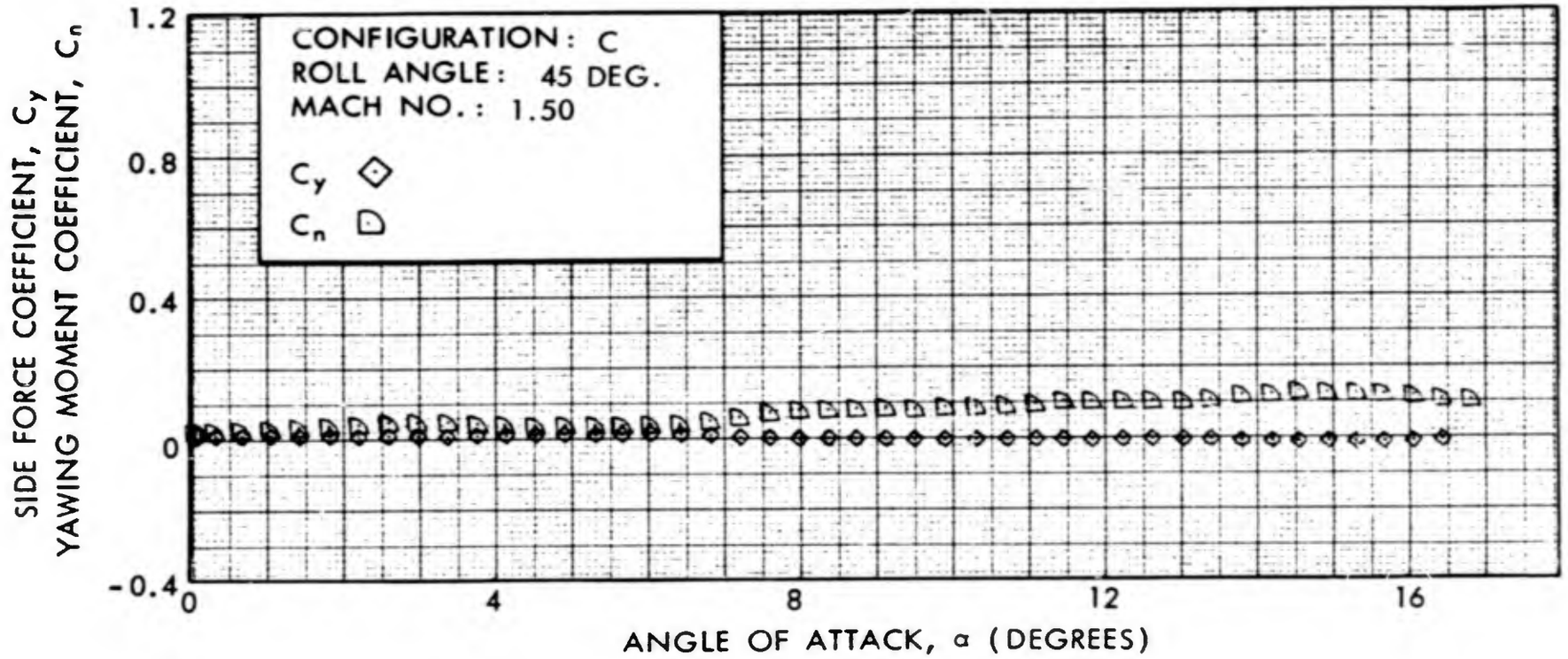


FIG. 79 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

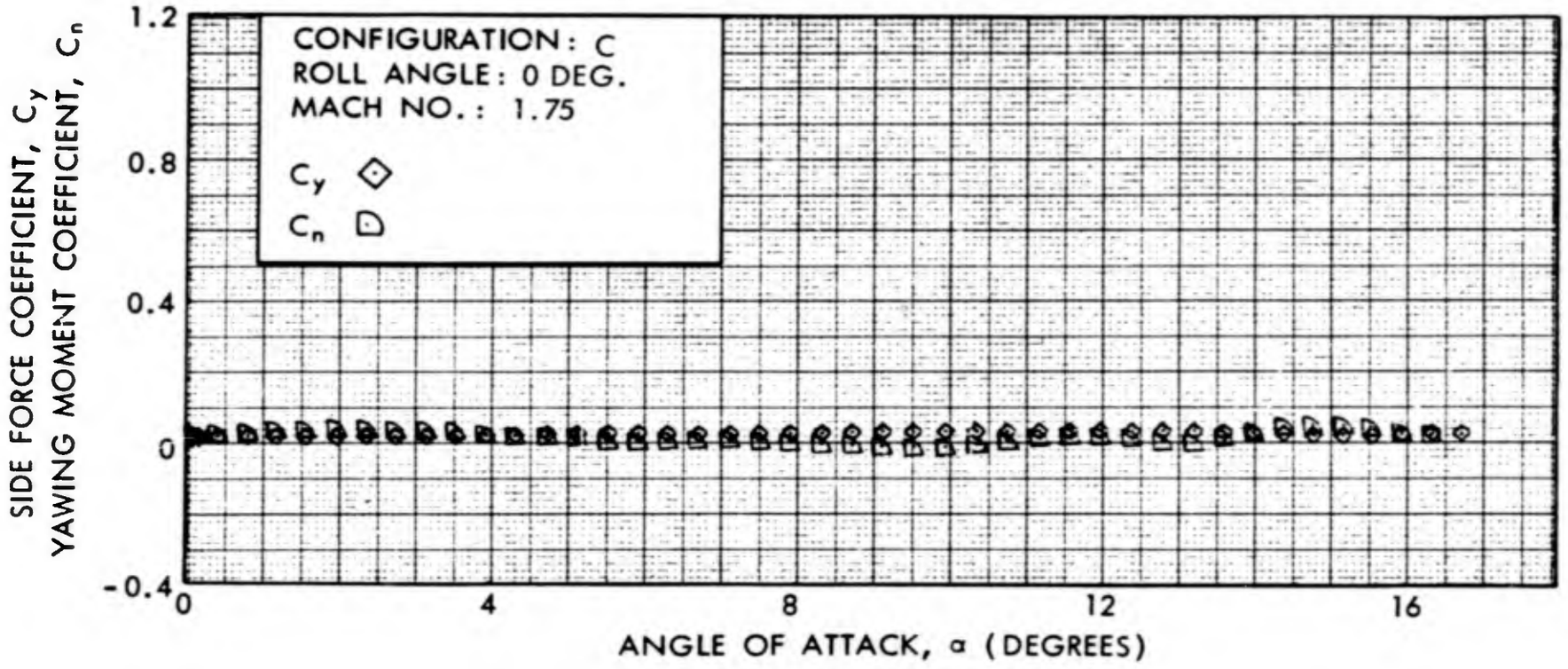


FIG. 80 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

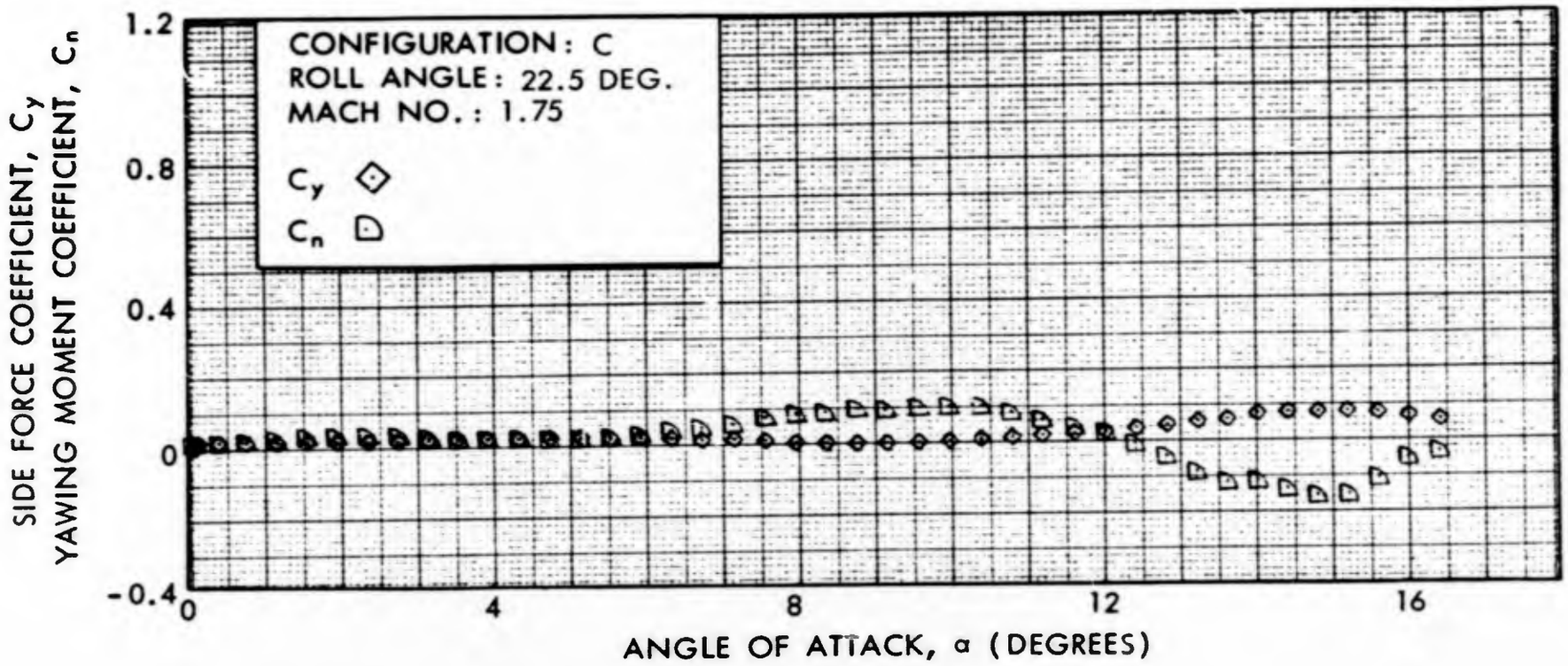


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FIG. 81 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

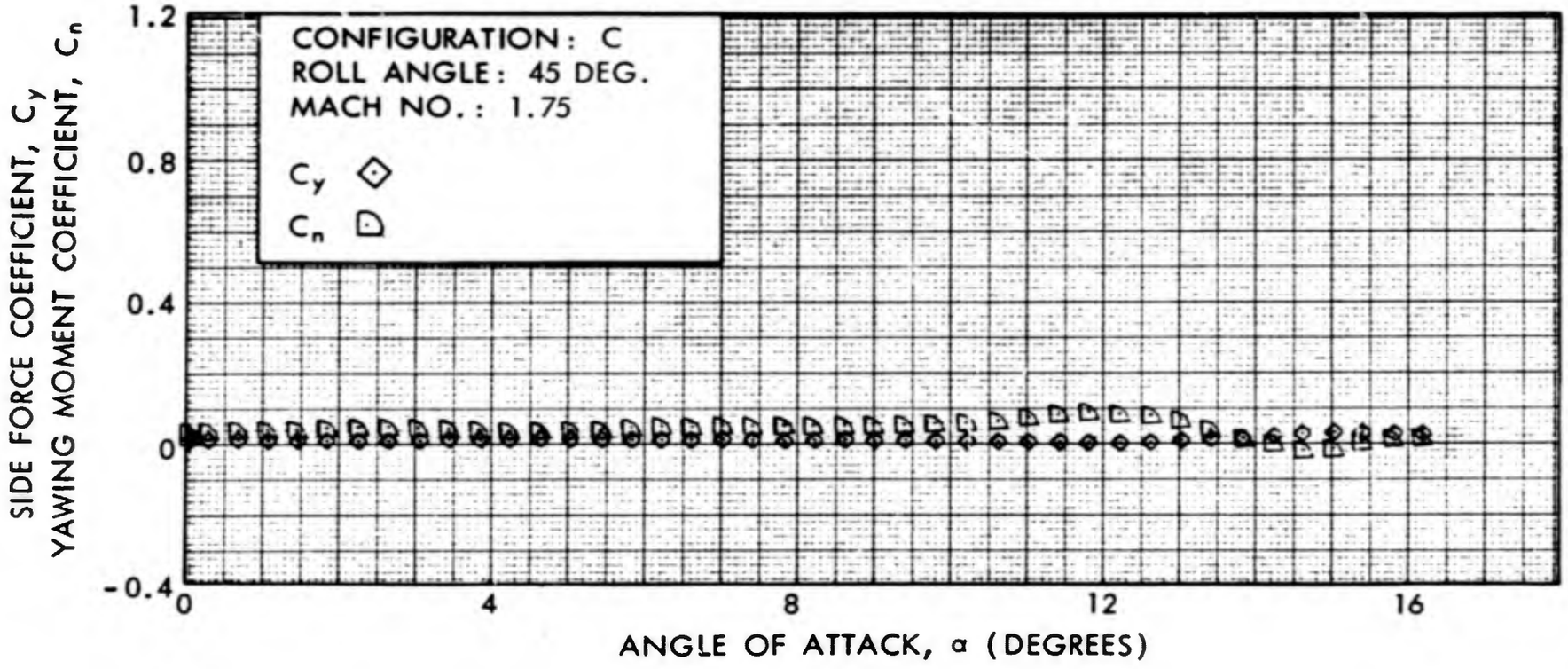

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FIG. 82 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

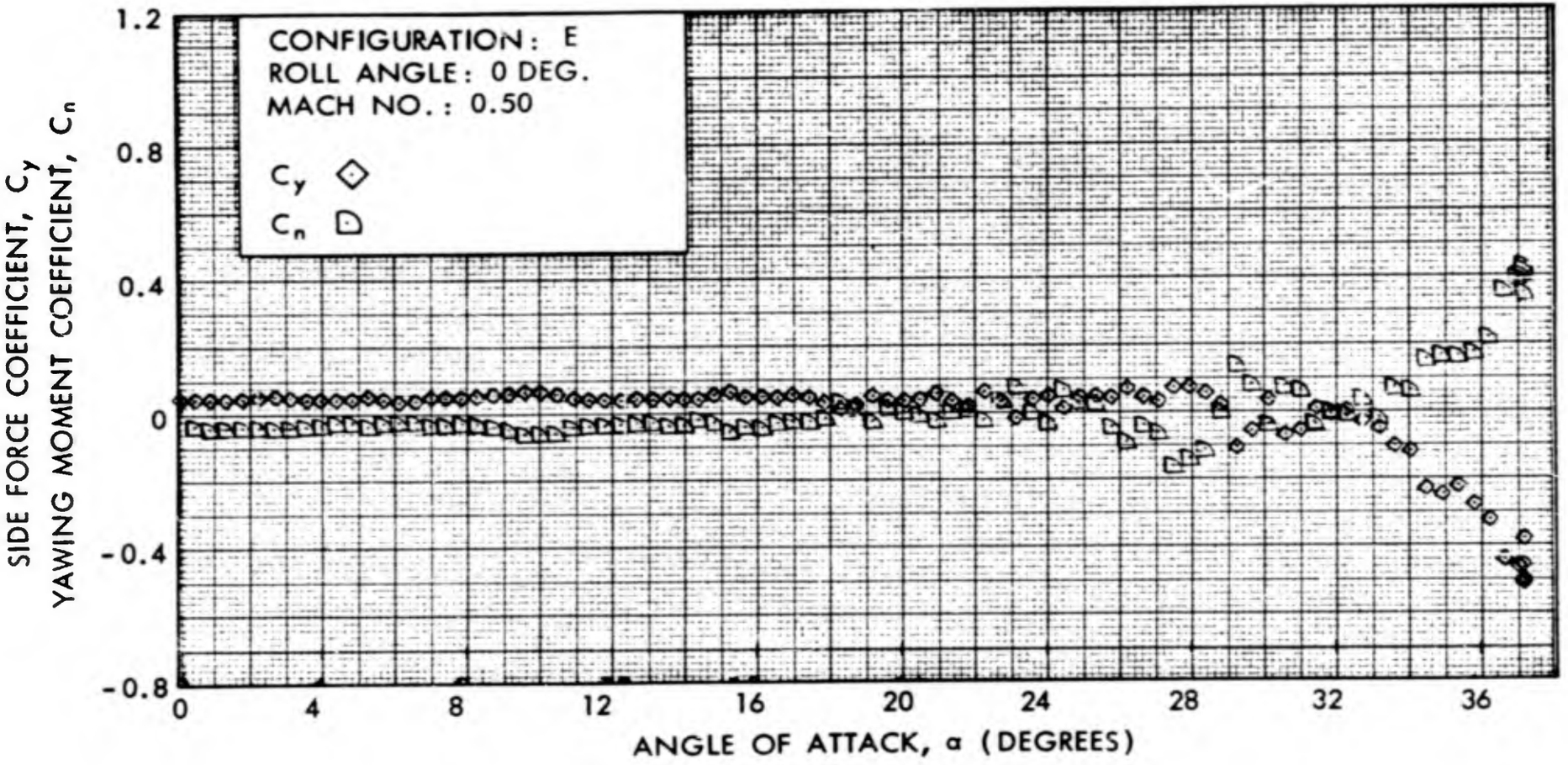

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FIG. 83 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

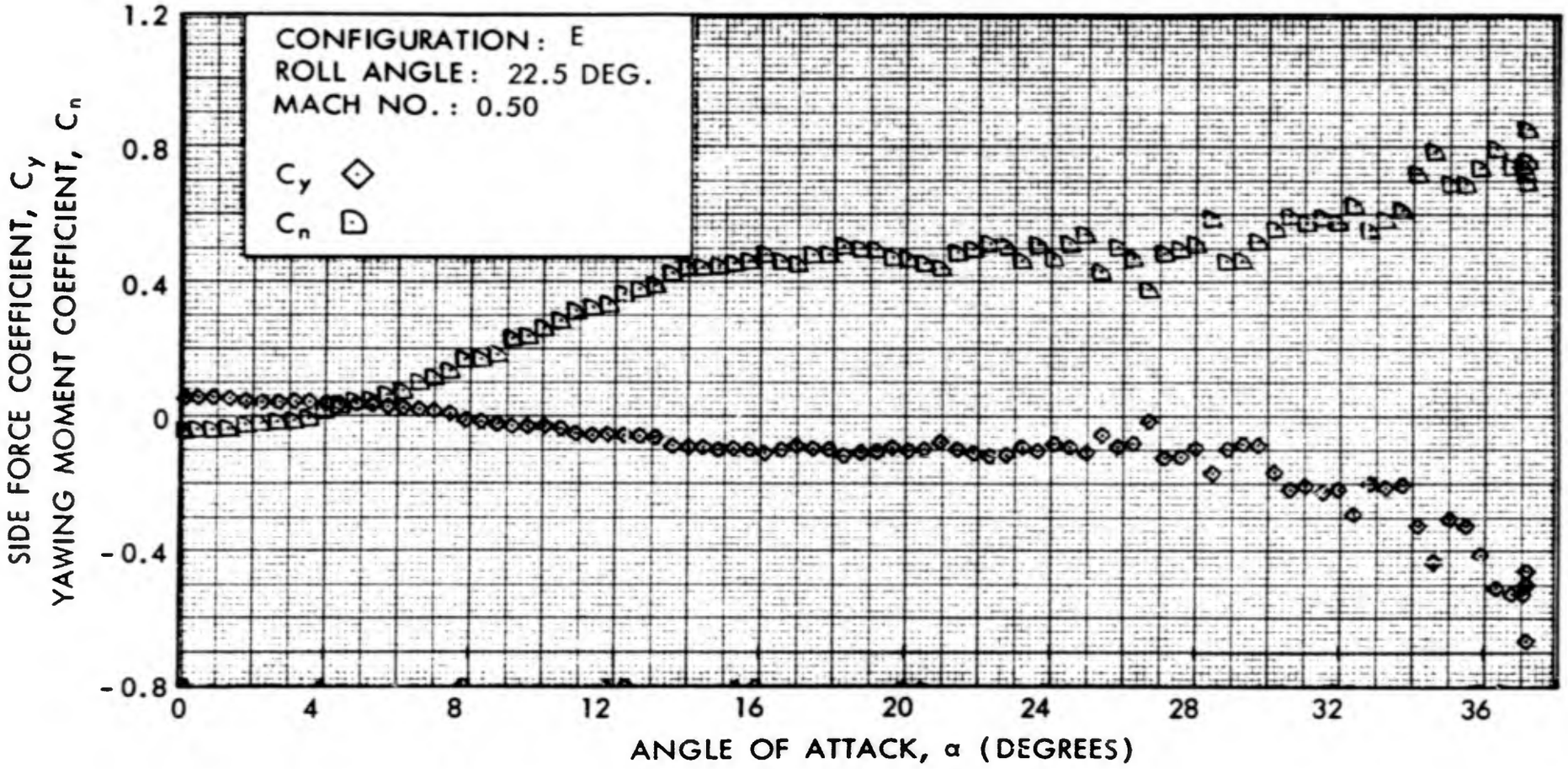

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FIG. 84 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

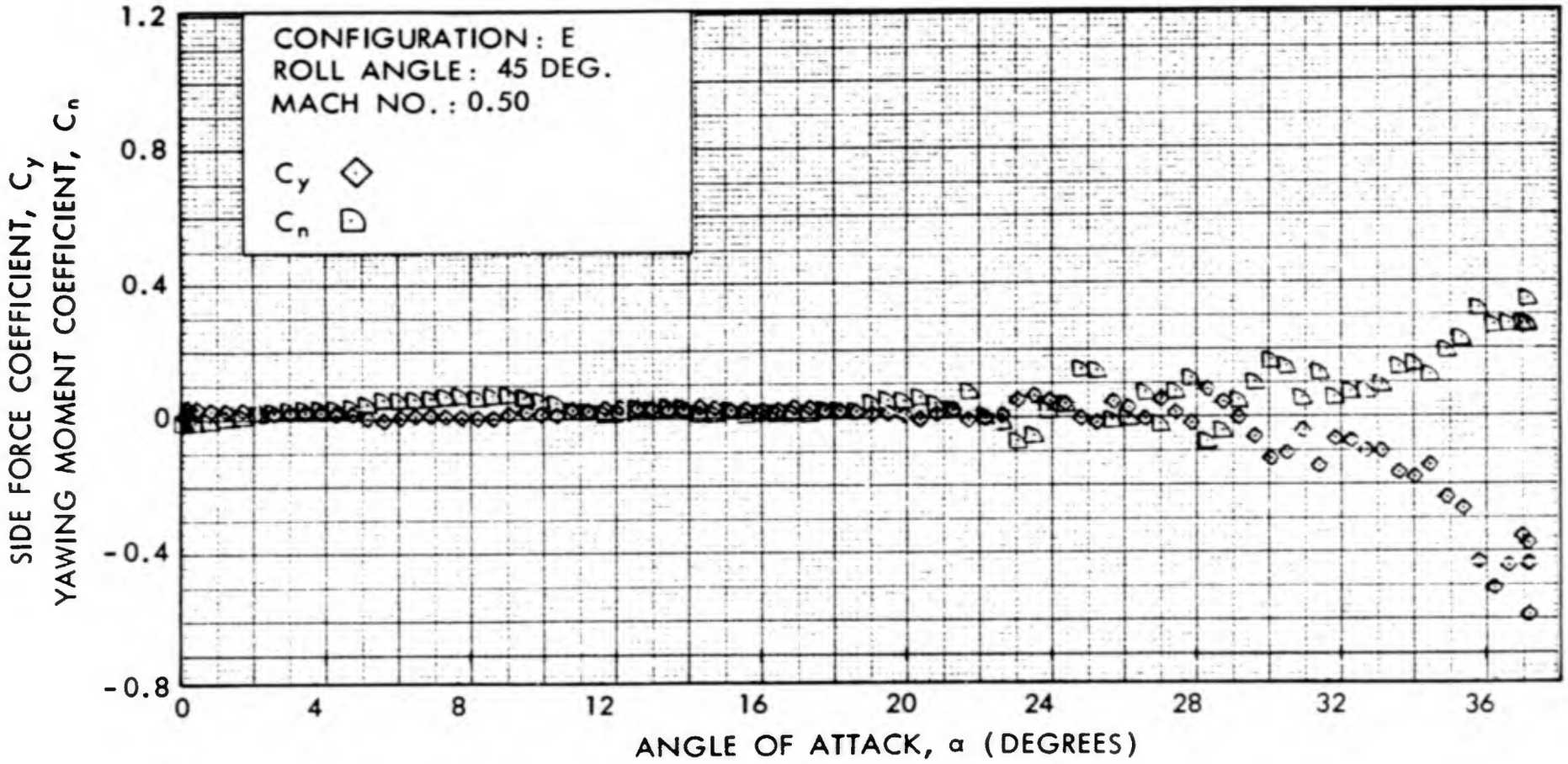

FIG. 85 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

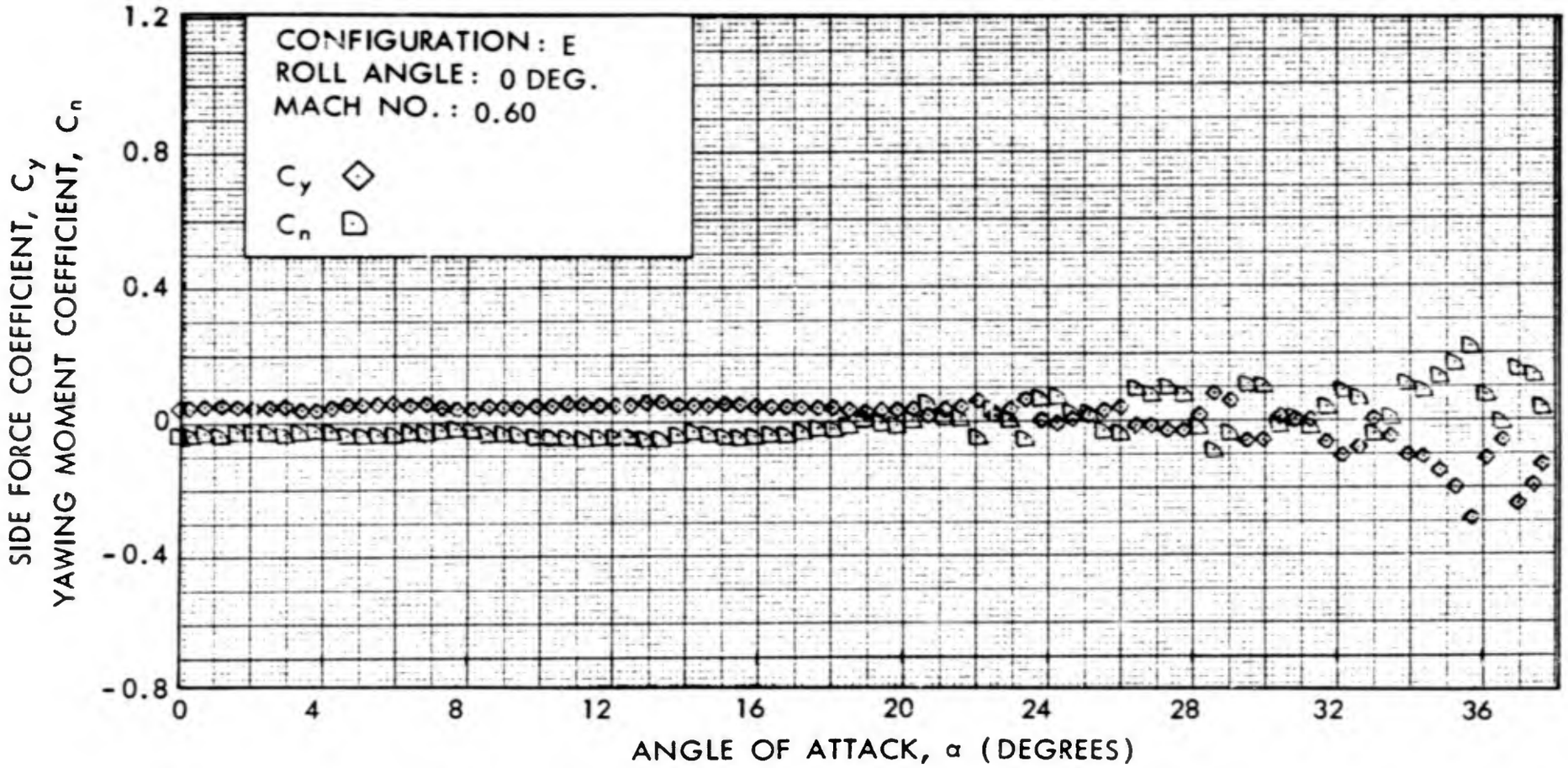

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FIG. 86 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

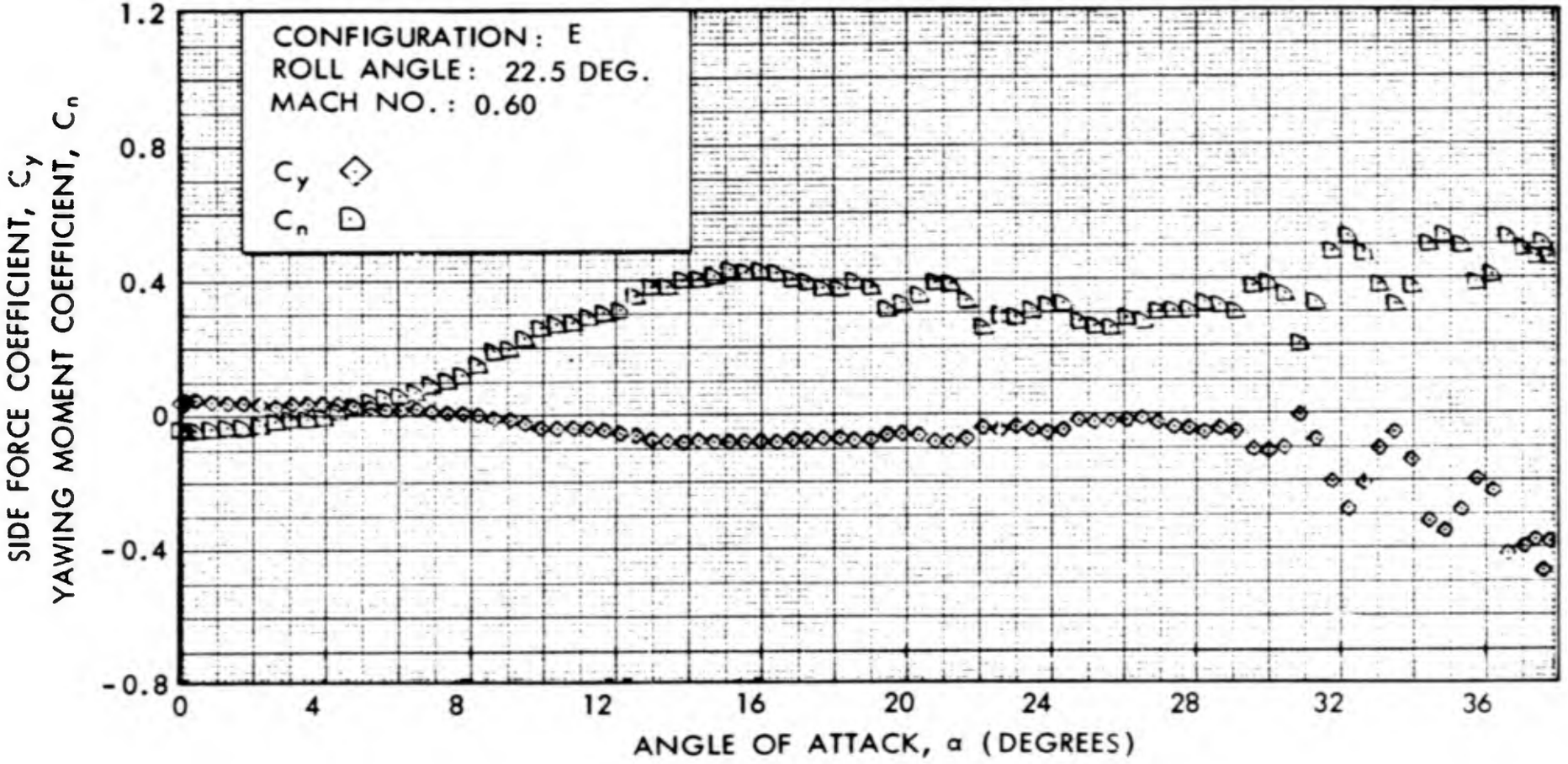

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FIG. 87 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

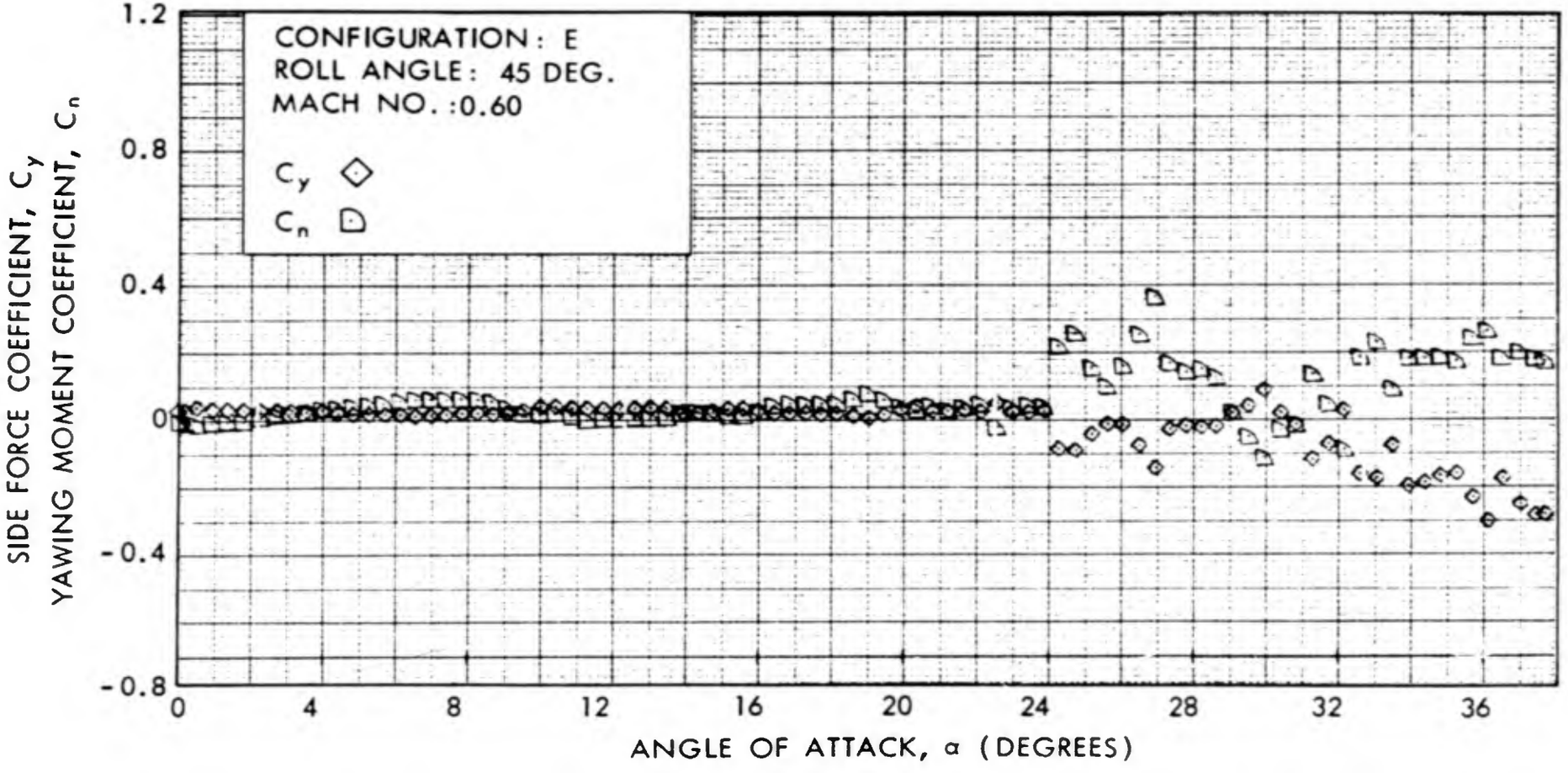

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FIG. 88 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

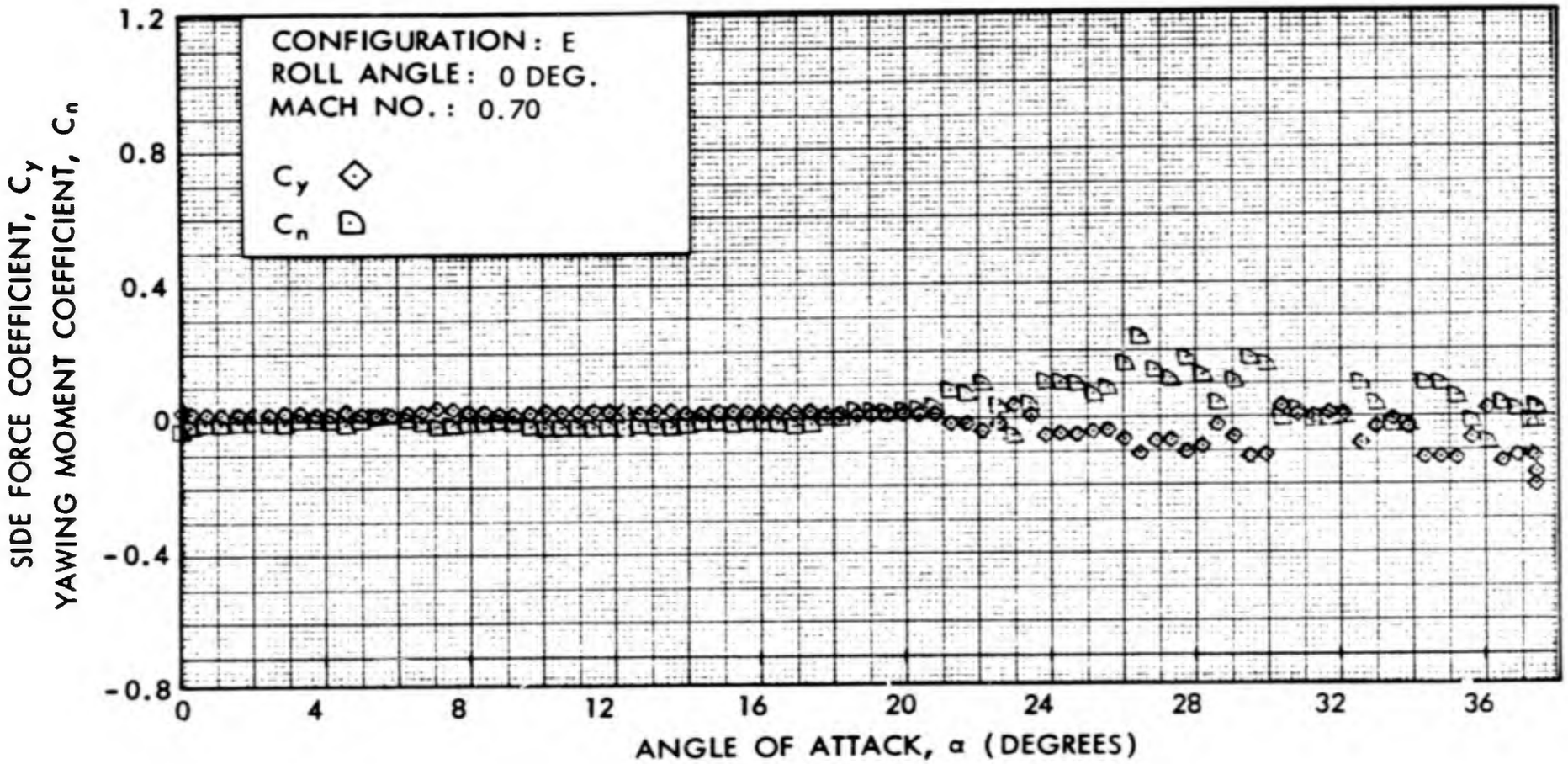


FIG. 89 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

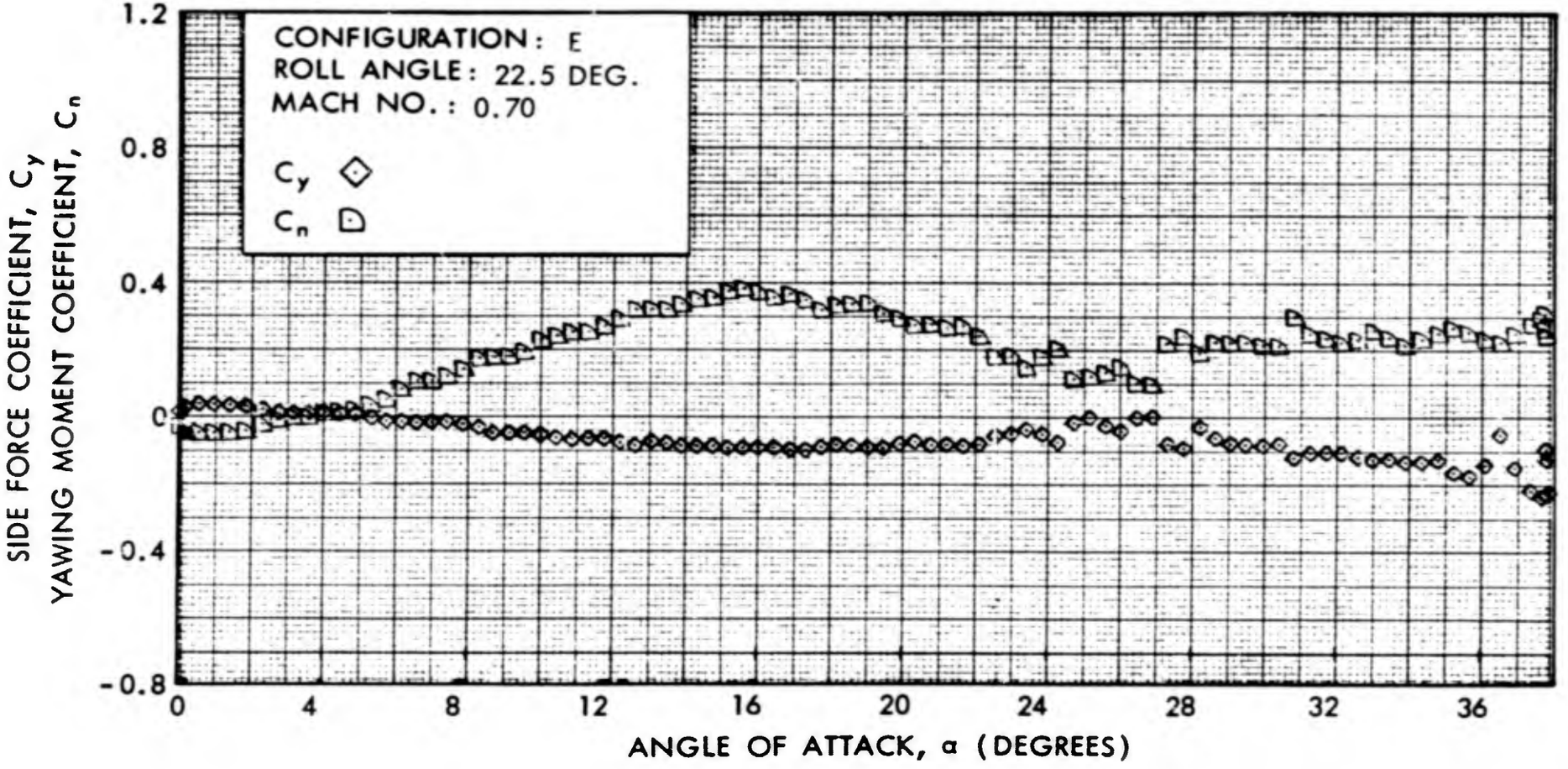
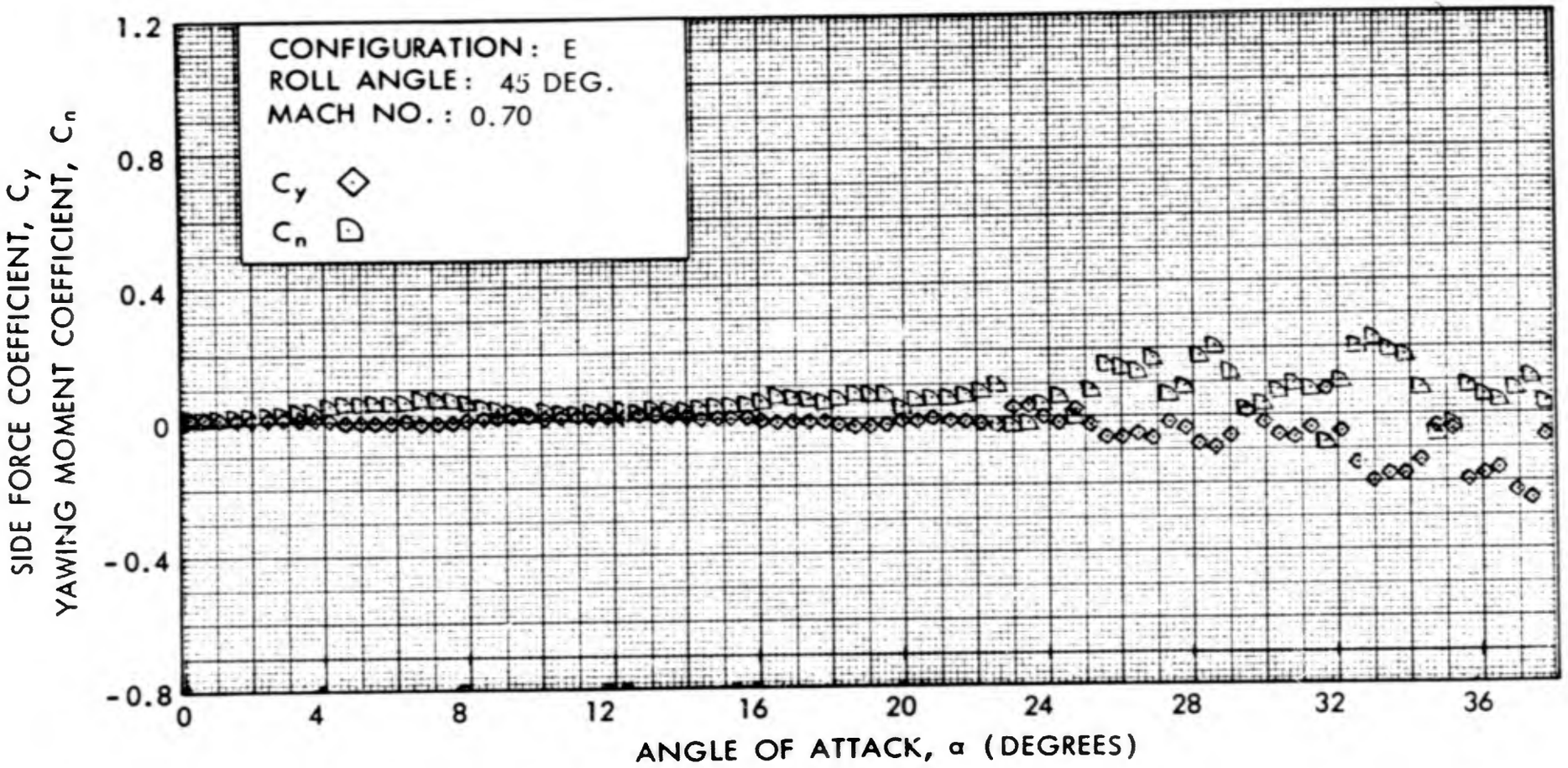


FIG. 90 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



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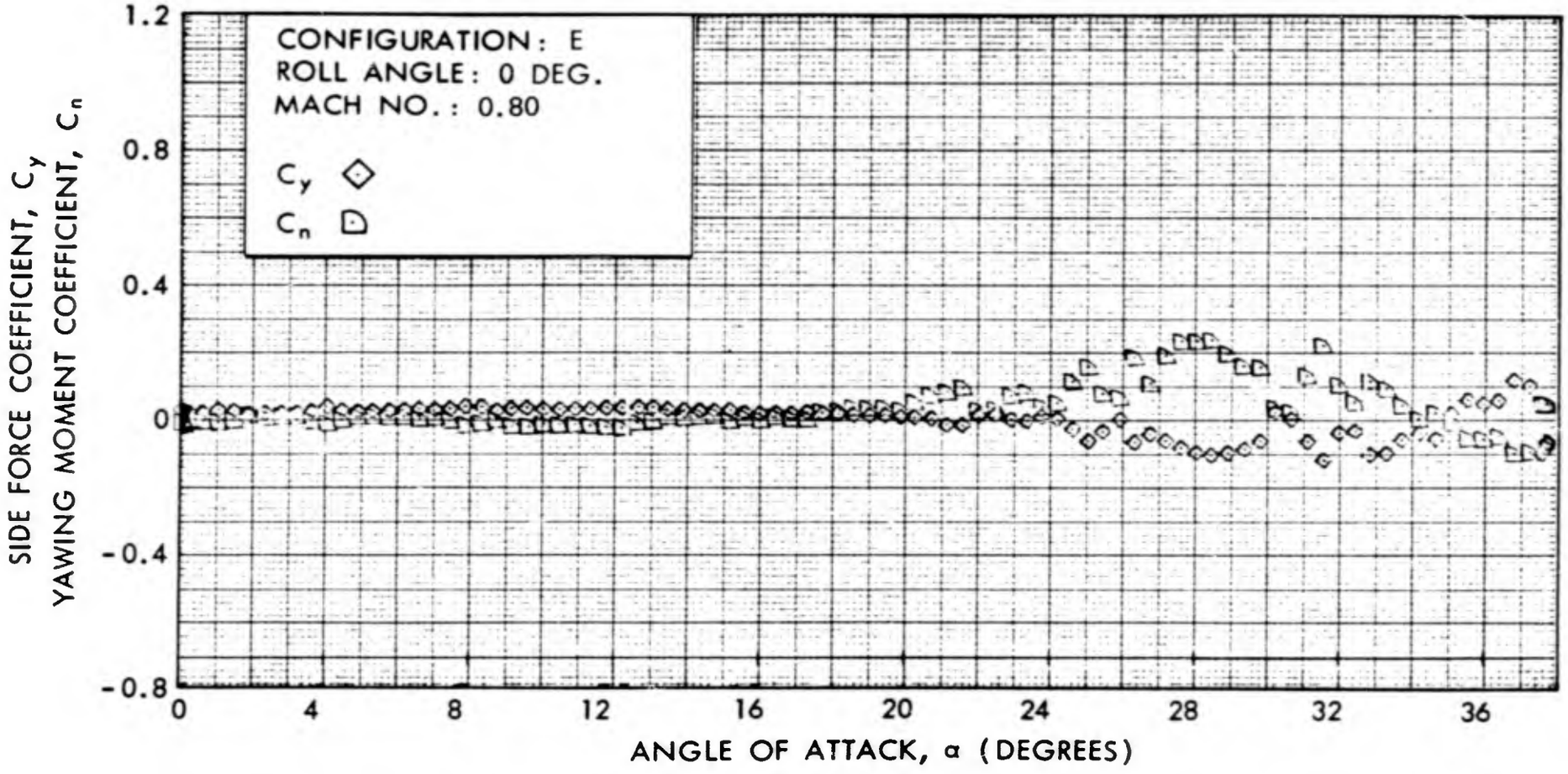

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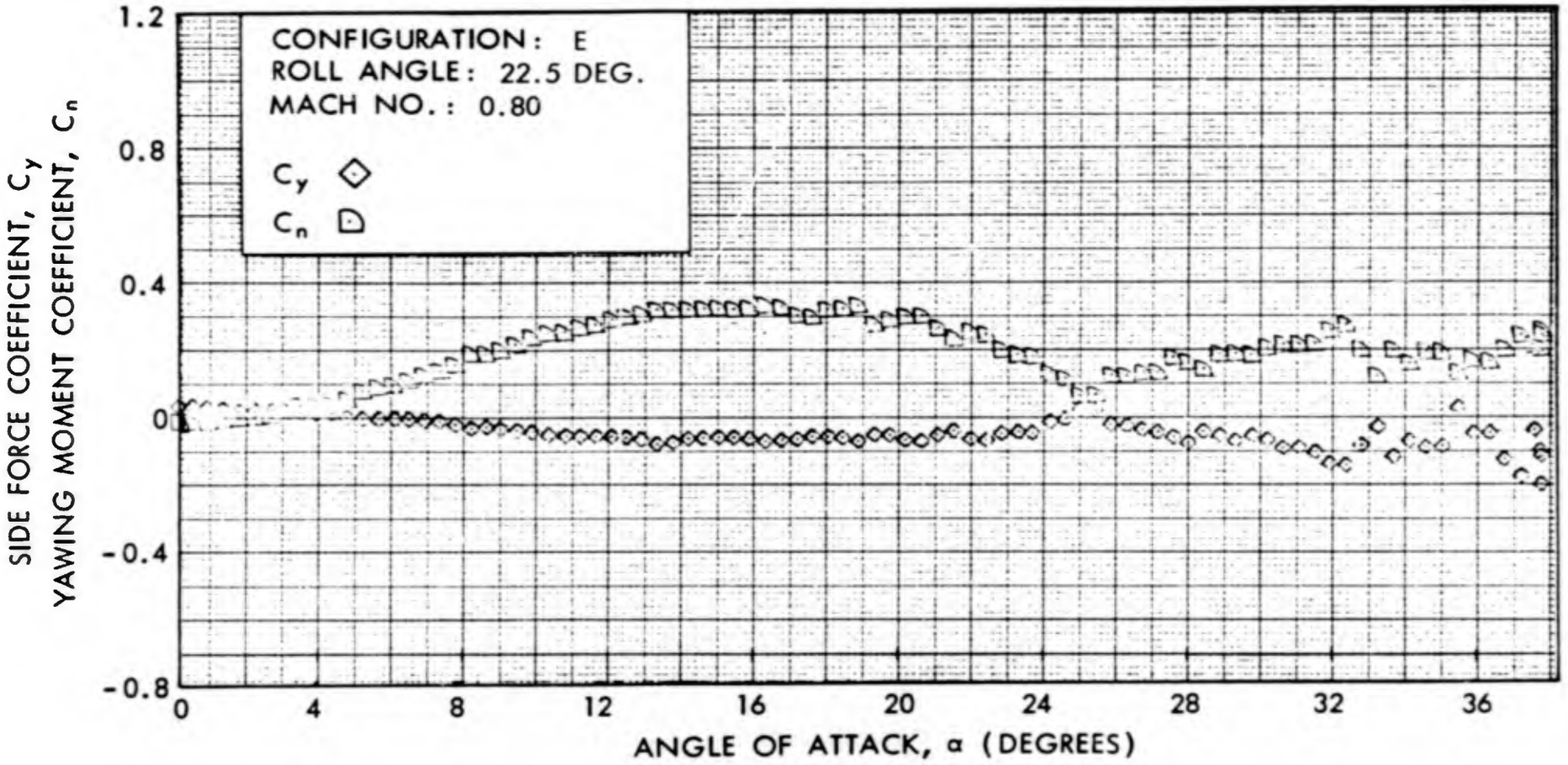

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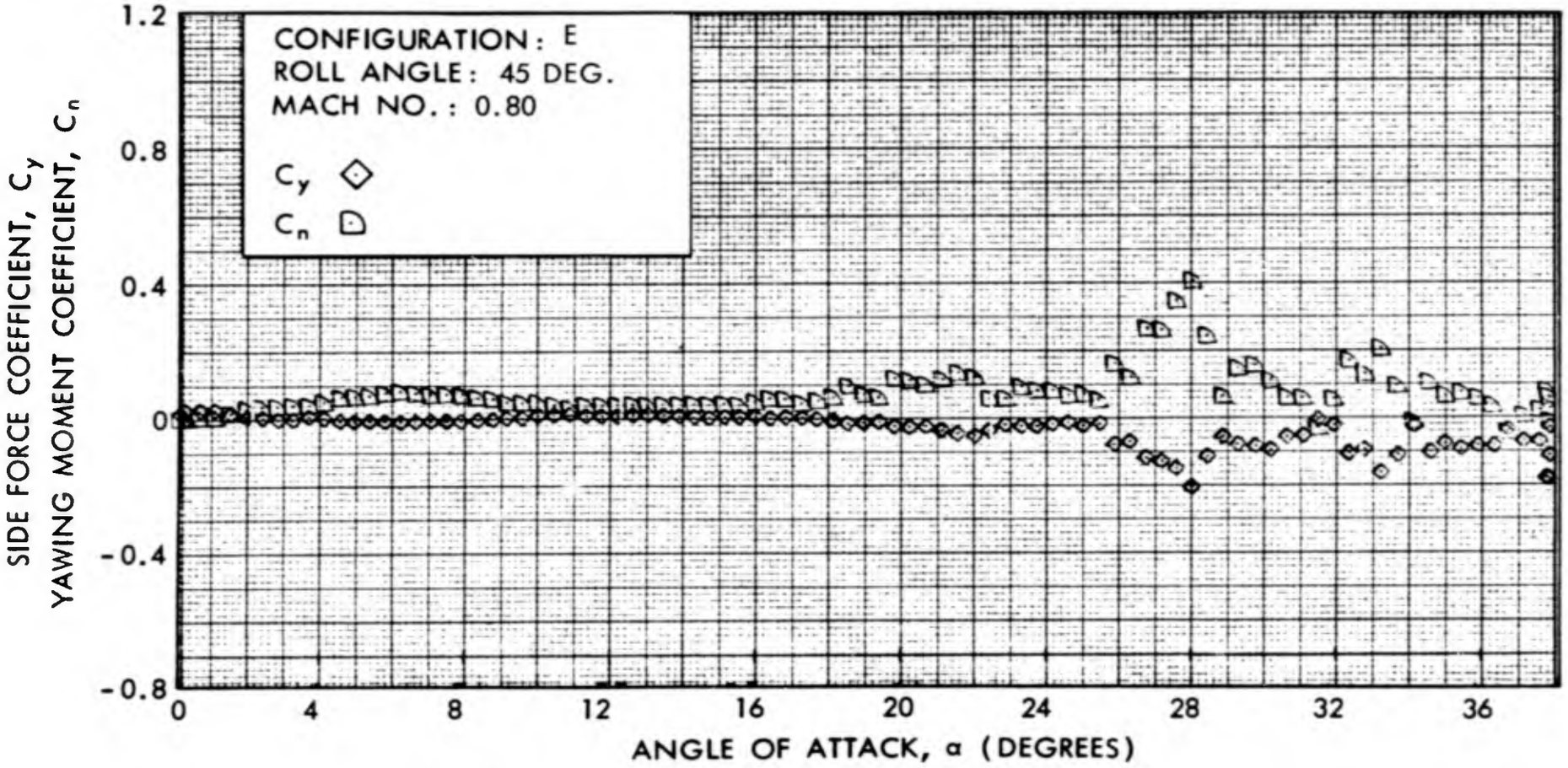

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FIG. 94 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

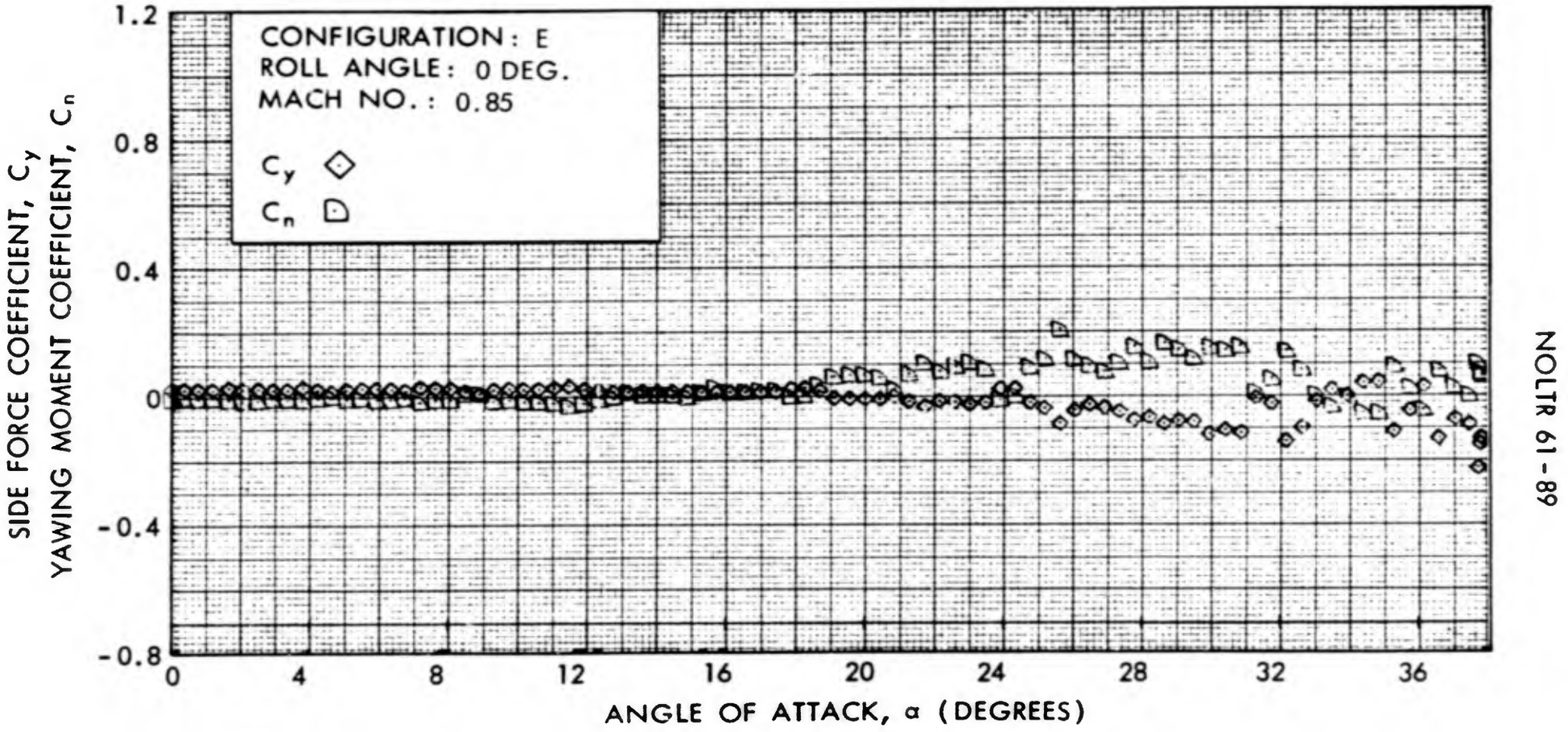

FIG. 95 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

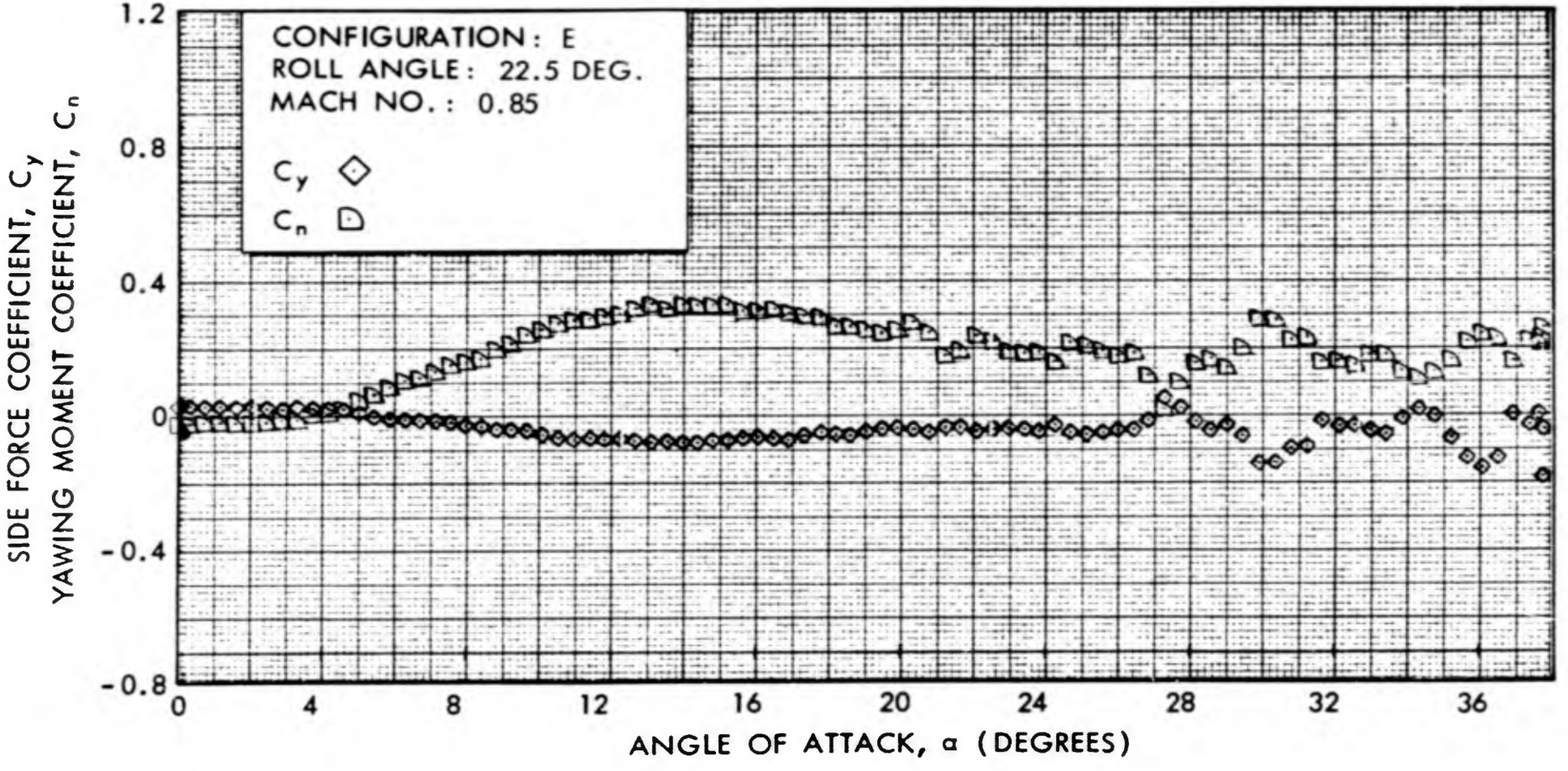

FIG. 96 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

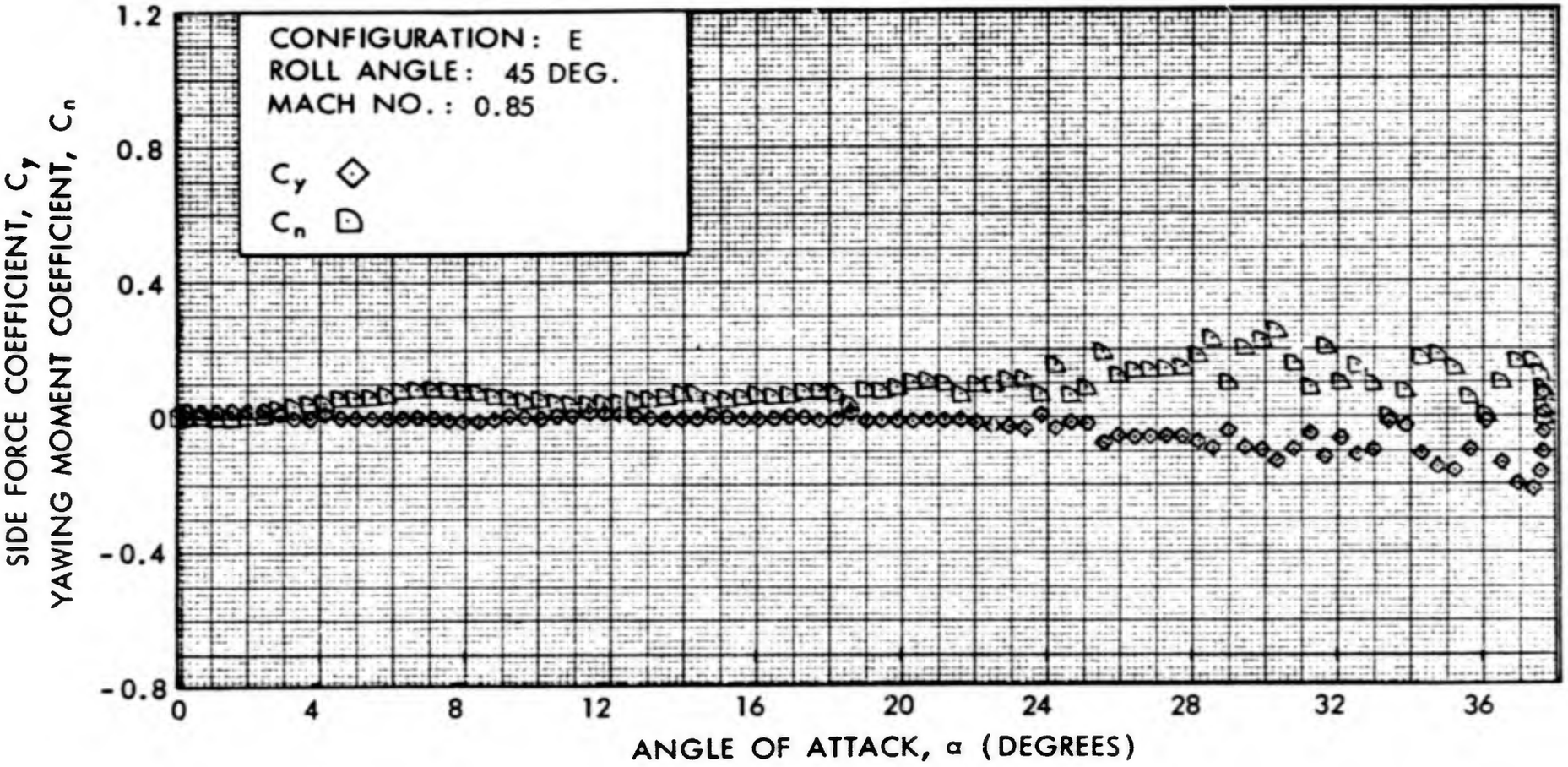

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FIG. 97 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

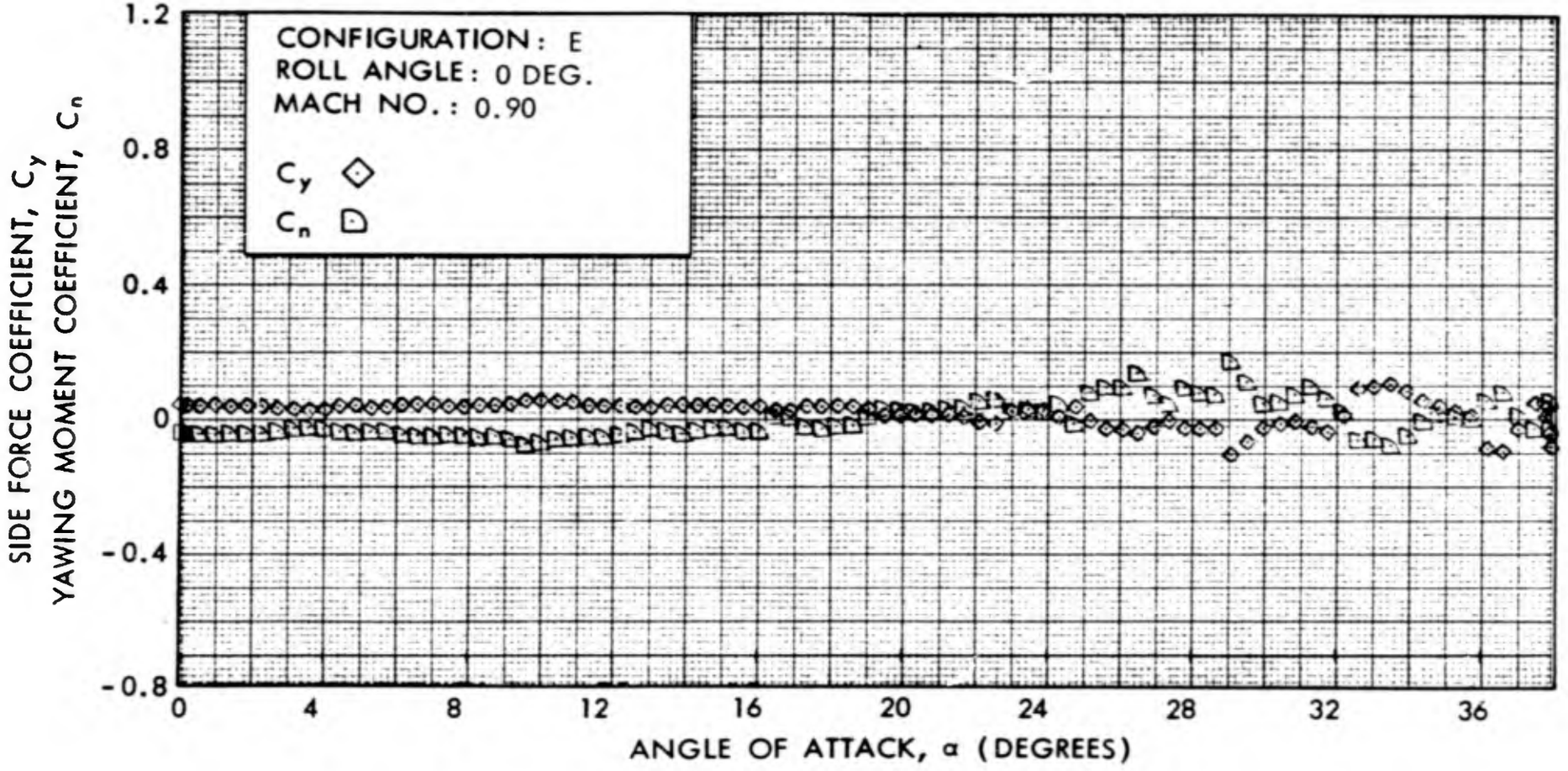


FIG. 98 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

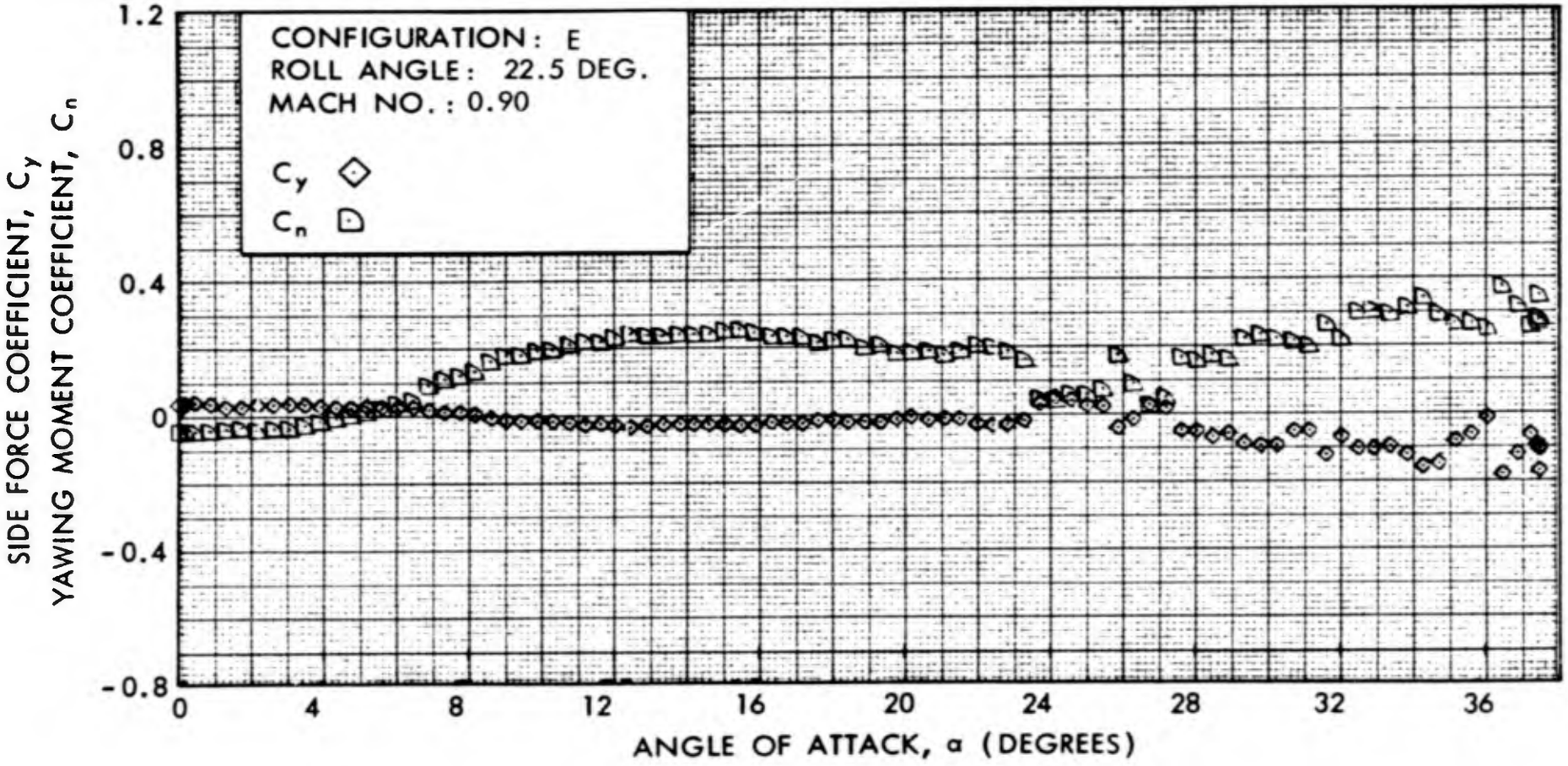


FIG. 99 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

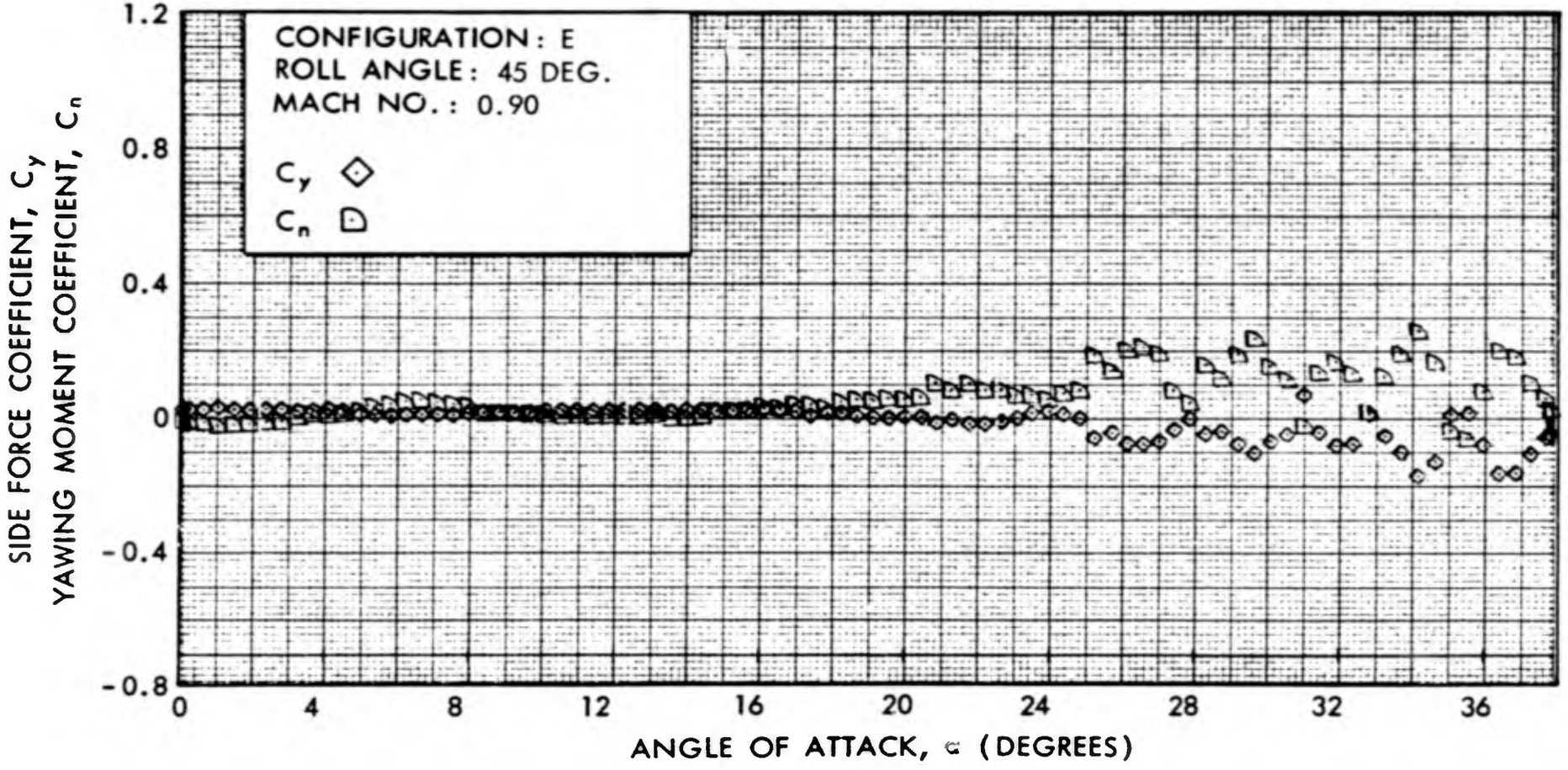


FIG. 100 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

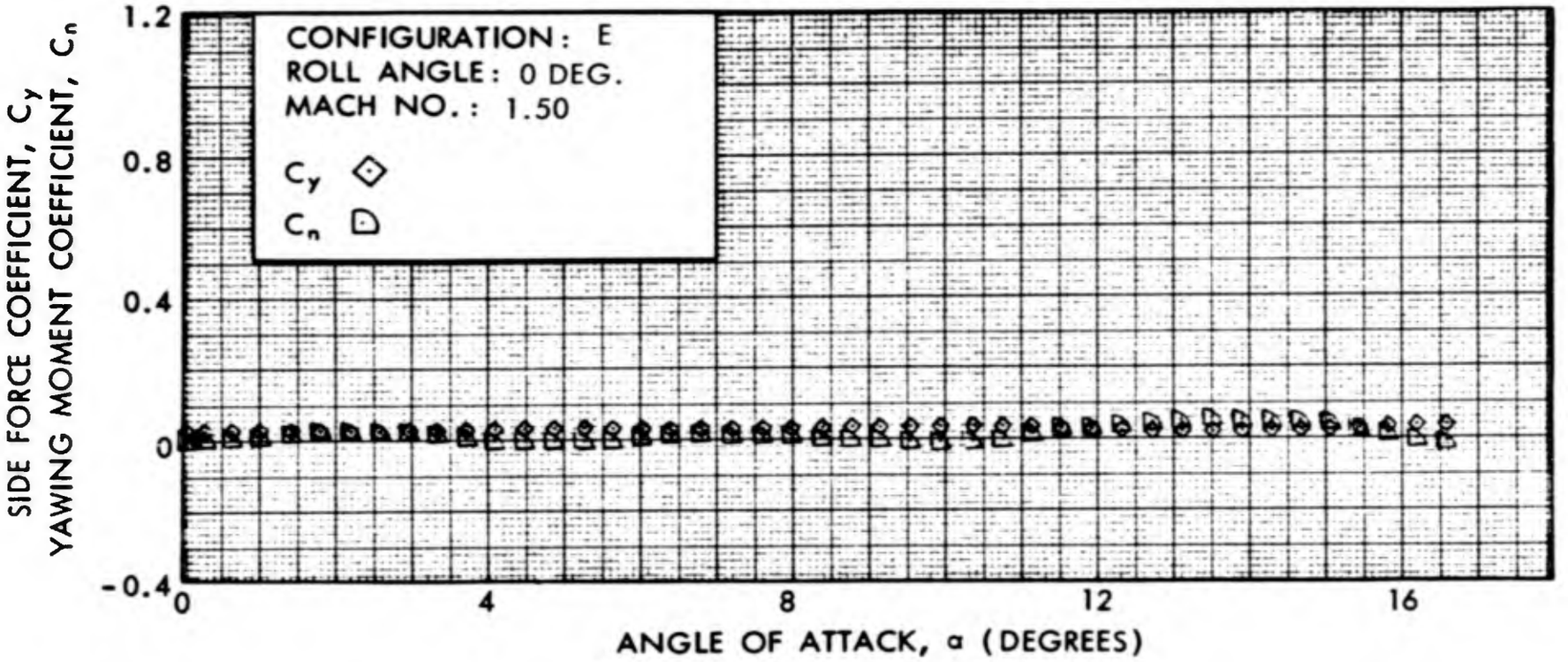


FIG. 101 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

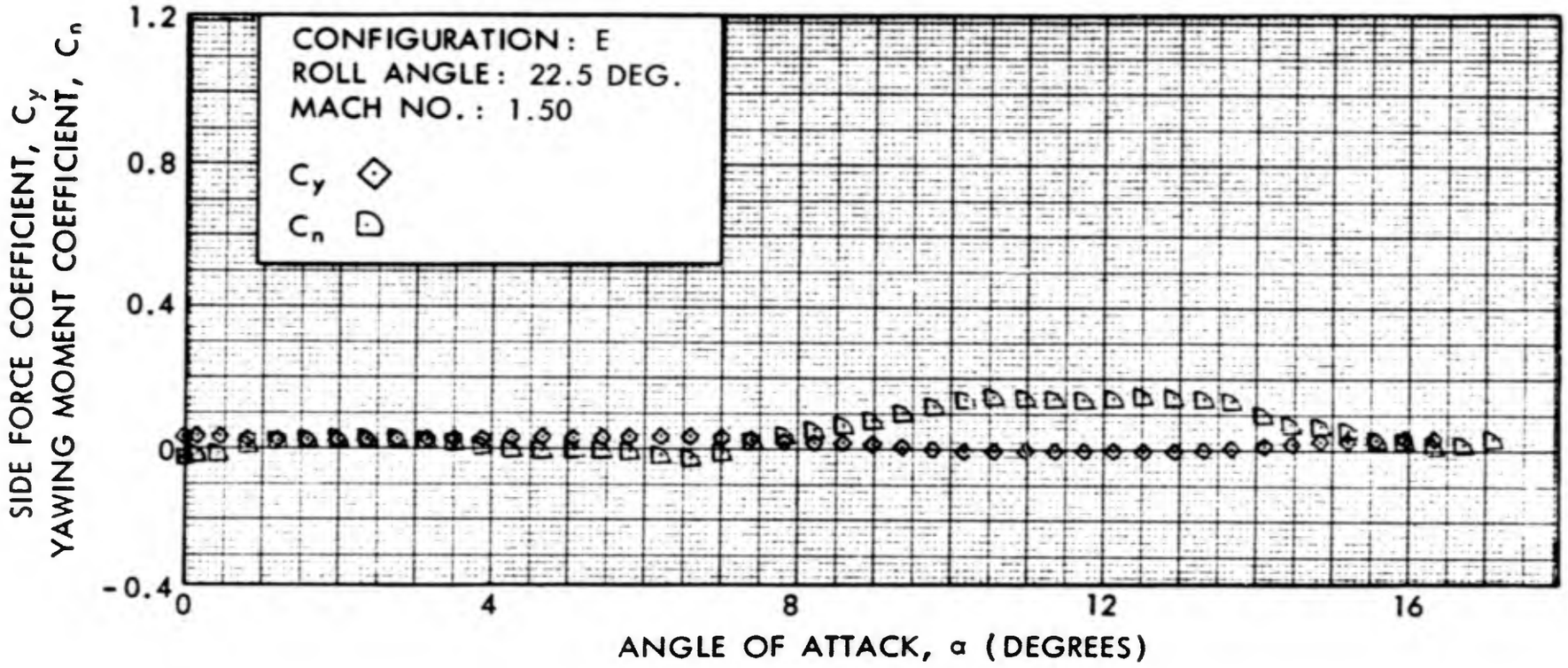
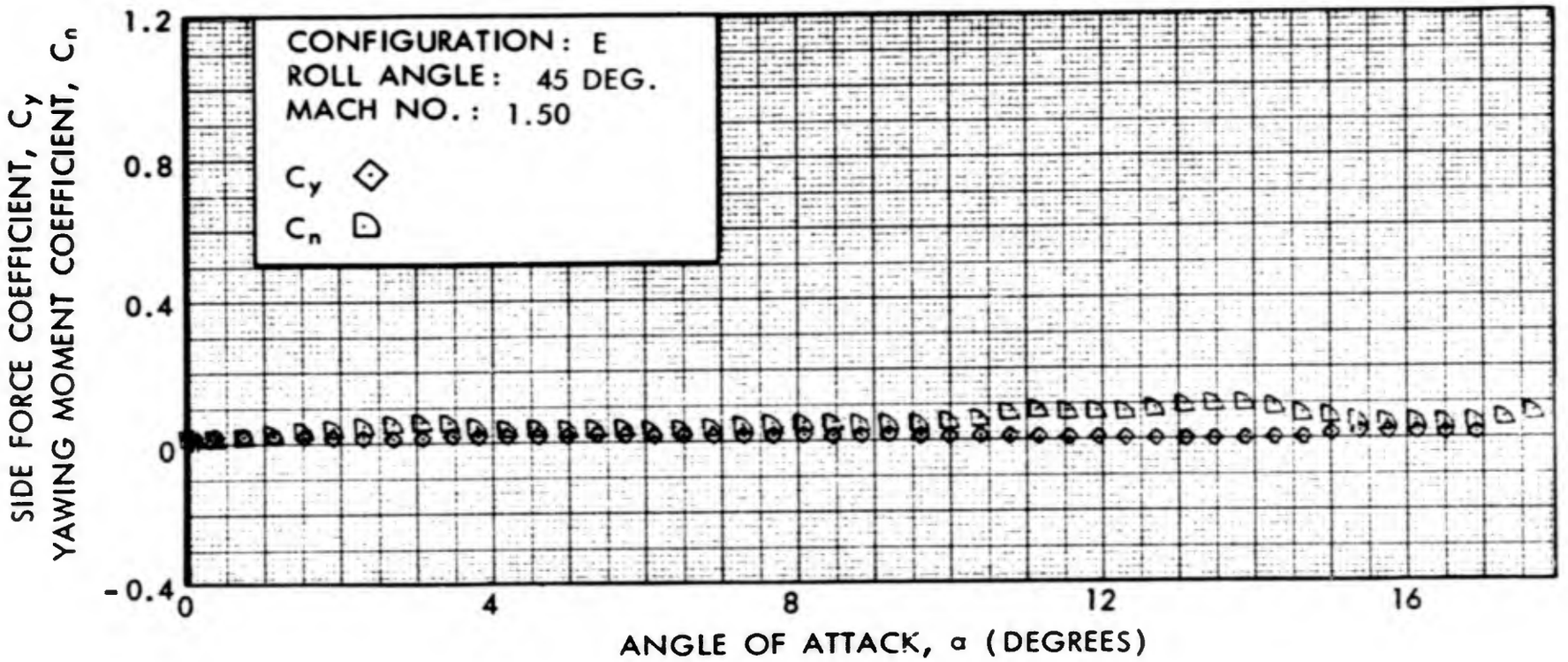


FIG. 102 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK



NOLTR 61-89

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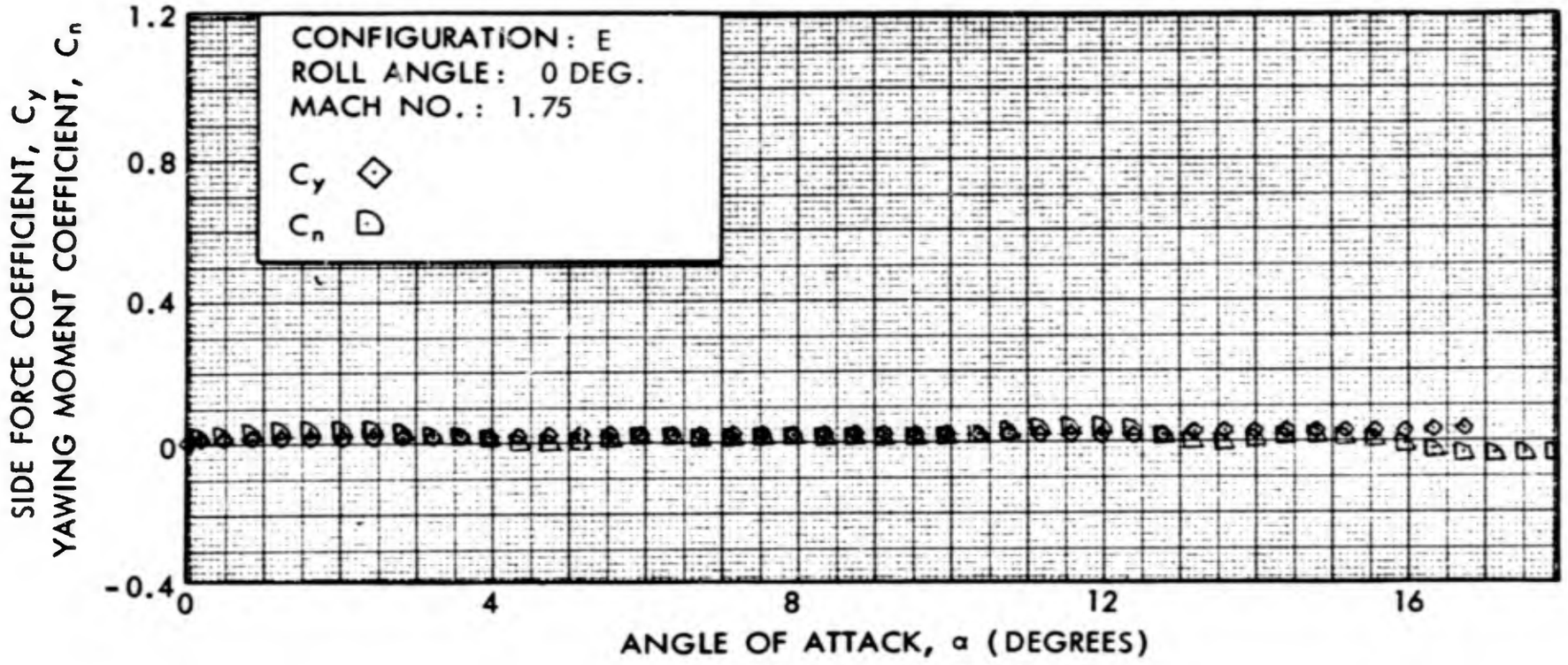

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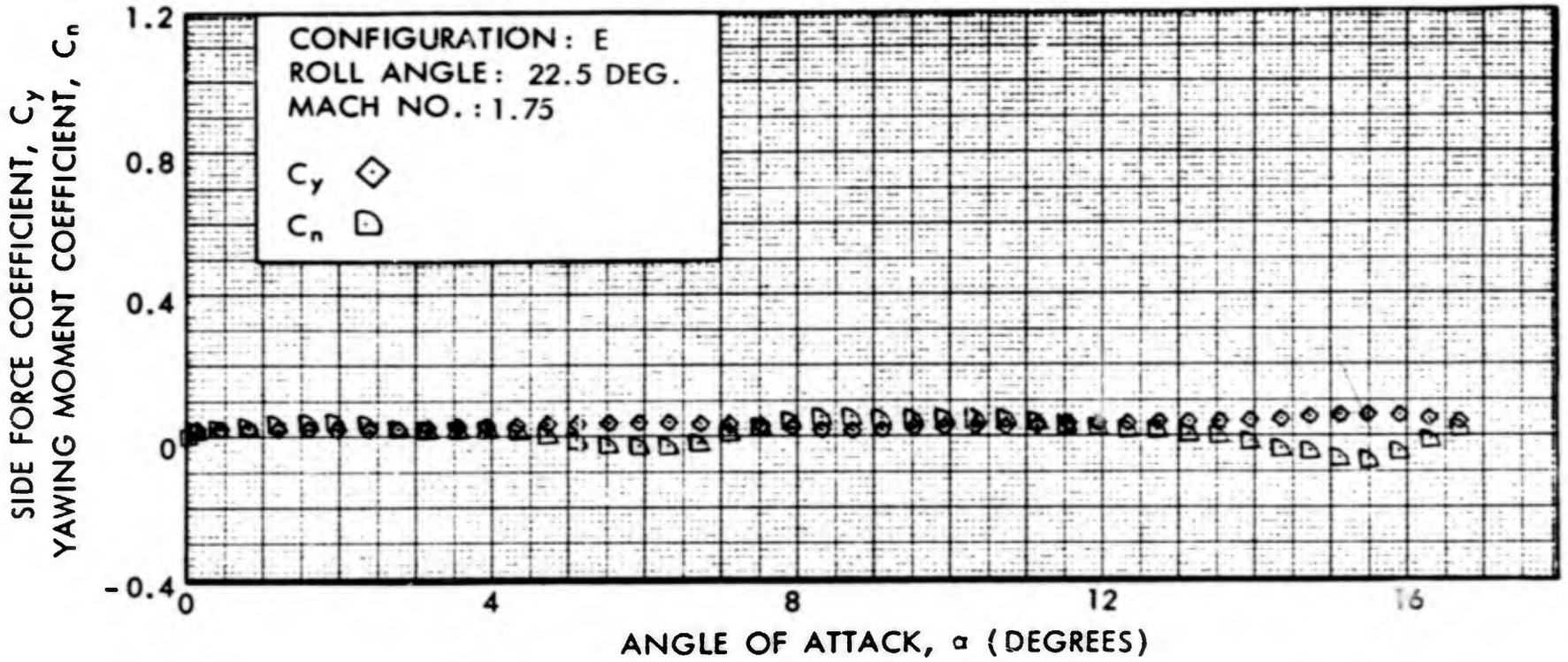

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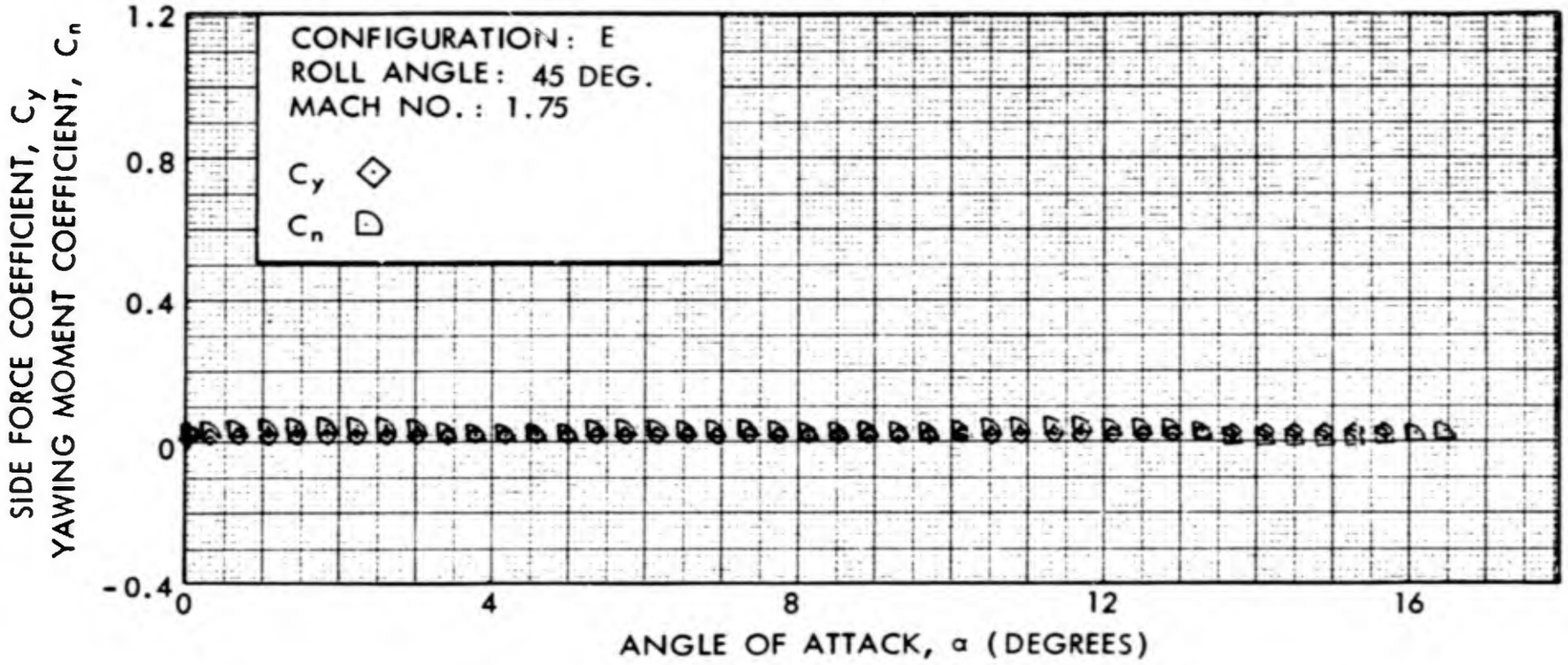

FIG. 106 SIDE FORCE COEFFICIENT AND YAWING MOMENT COEFFICIENT VERSUS ANGLE OF ATTACK

TABLE 1

CONFIGURATIONS

A. Fixed Cruciform Tail, δ = 0, 2, 4 Degrees

B. Free-Spinning Cruciform Tail, δ = 2, 4 Degrees

C. Fixed Split-Skirt Tail, Skirt Angle 10 Degrees

D. Free-Spinning Split-Skirt Tail, Skirt Angle 10 Degrees

E. Fixed Split-Skirt Tail, Skirt Angle 15 Degrees

F. Free-Spinning Split-Skirt Tail, Skirt Angle 15 Degrees

G. Free-Spinning Monoplane Tail, δ = 2, 4 Degrees

TABLE 2

TUNNEL TEST CONDITIONS

MACH NUMBER	DYNAMIC PRESSURE (LBS/IN^2)	REYNOLDS NO./FT x 10^{-6}
0.50	2.10	3.00
0.60	2.80	3.40
0.70	3.48	3.75
0.80	4.13	4.00
0.85	4.42	4.15
0.90	4.70	4.25
0.95	4.90	4.35
1.50	6.13	4.40
1.75	5.80	4.12

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Security Classification

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3. REPORT TITLE
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4. DESCRIPTIVE NOTES *(Type of report and inclusive dates)*

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11. SUPPLEMENTARY NOTES

12. SPONSORING MILITARY ACTIVITY

13. ABSTRACT

The M823 Configuration is an instrumented free fall store used in bomb research programs. This report presents the results of static wind tunnel tests for the basic forebody with split-skirt stabilizers attached.

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14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
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