Enhancement of AGARD-303 Data

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OUTLINE

- **PROBLEMS WITH AGARD**-303

- **COMBINING** (C_L, C_D) **&** (C_N, C_T)

- **DIGITIZING FIGURE 12**

- **DATA FITTING**
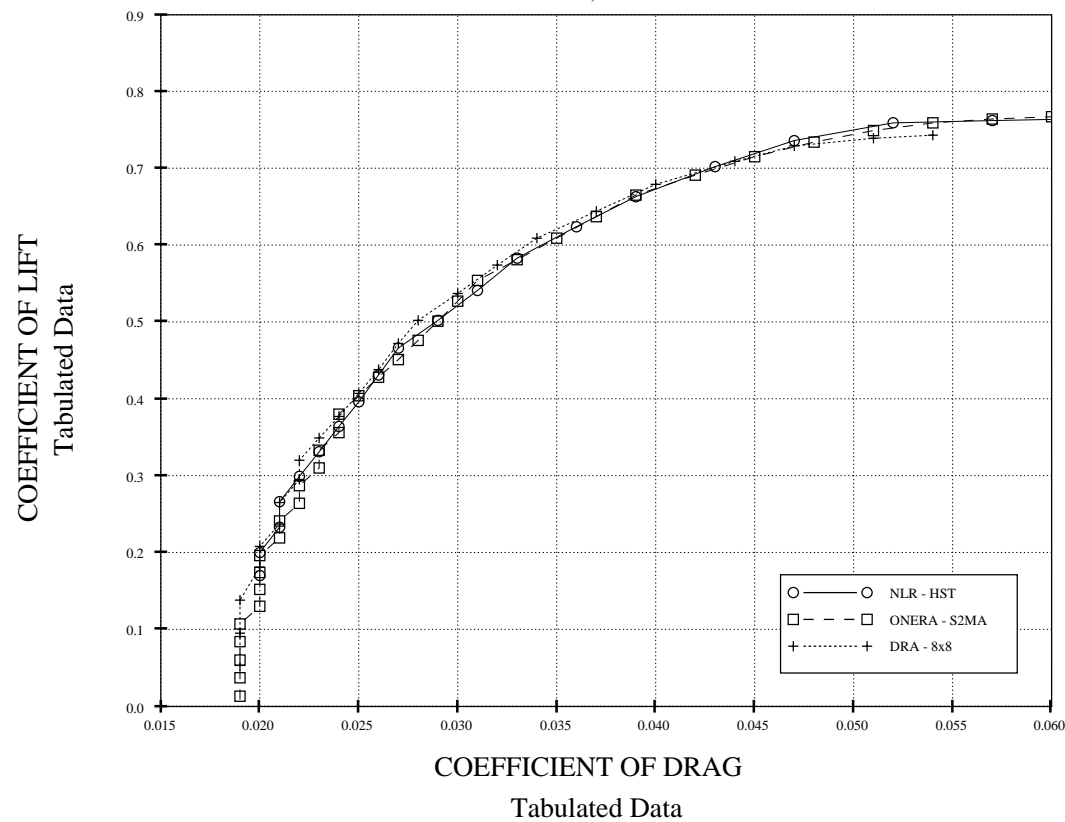
PROBLEMS WITH AGARD-303

- **PRECISSION OF PUBLISHED DATA**
  - Drag Published To Only 3 Decimal Places

- **HIGHER PRECISSION NOT AVAILABLE**

- **P.O.C. IS NON-RESPONSIVE**

PROBLEMS WITH AGARD-303

DLR-F4 WING / BODY GEOMETRY

AGARD Report 303 - Figure 12

Mach = 0.75 , Re = 3 Million

COMBINING (C_L, C_D) & (C_N, C_T)

- **NOTES**
  - Original Data $\in$ Published Data ± 0.0005
  - $C_L = C_N * cos(\alpha) - C_T * sin(\alpha)$
  - $C_D = C_T * cos(\alpha) + C_N * sin(\alpha)$

- **CONSTRUCT ± 0.0005 BOXES AROUND DATA**

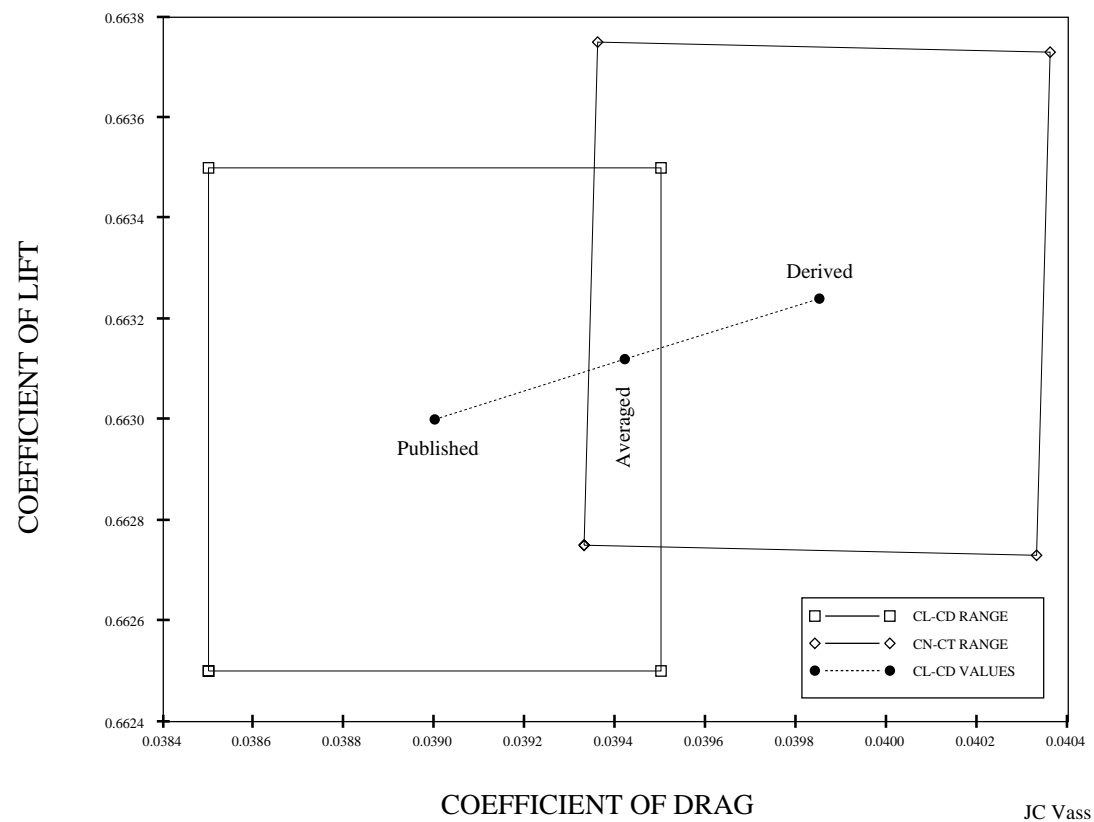- **ROTATE (C_N, C_T) INTO (C_L, C_D) SYSTEM**

- **OVER-LAP REGION TRAPS ORIGINAL DATA**
  - Some Data Are Greatly Improved
  - Some Data Are Slightly Improved

COMBINING (C_L, C_D) & (C_N, C_T)

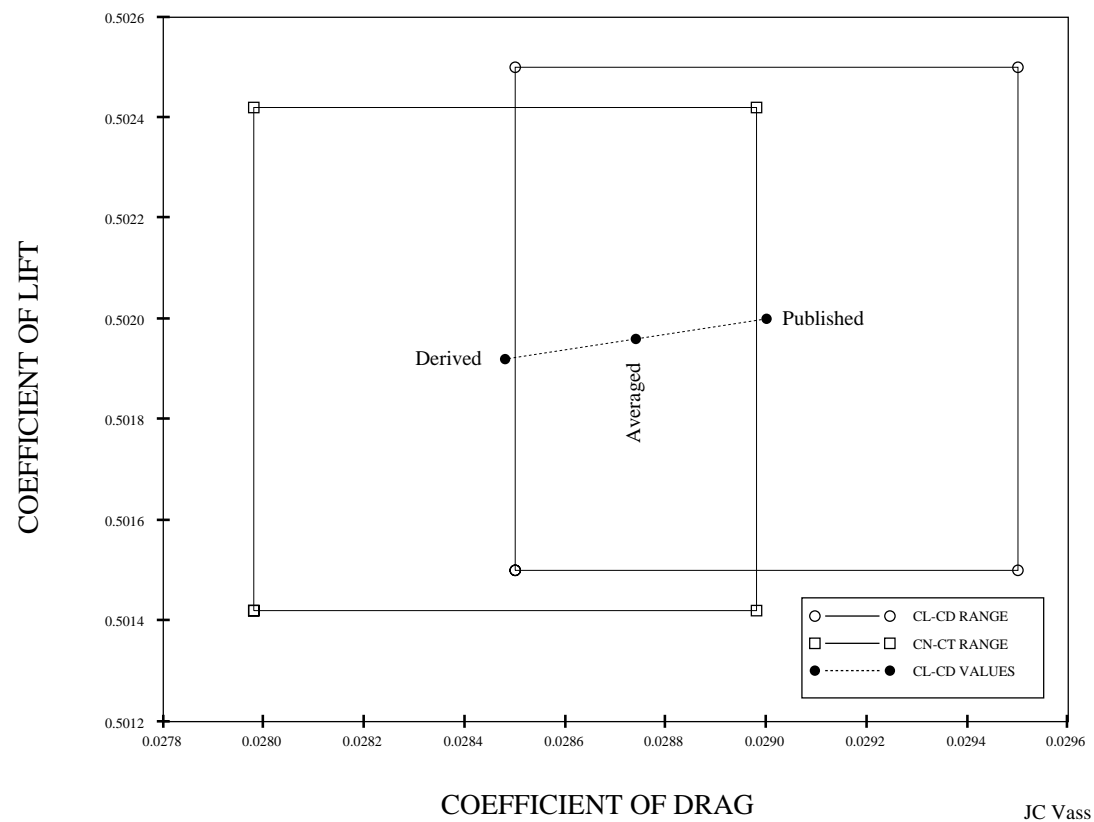AGARD 303: DRAG POLAR DATA ENHANCEMENT

Table 1.1.1.2 , Scan 15 , Alpha = 1.368 deg

COMBINING (C_L, C_D) & (C_N, C_T)

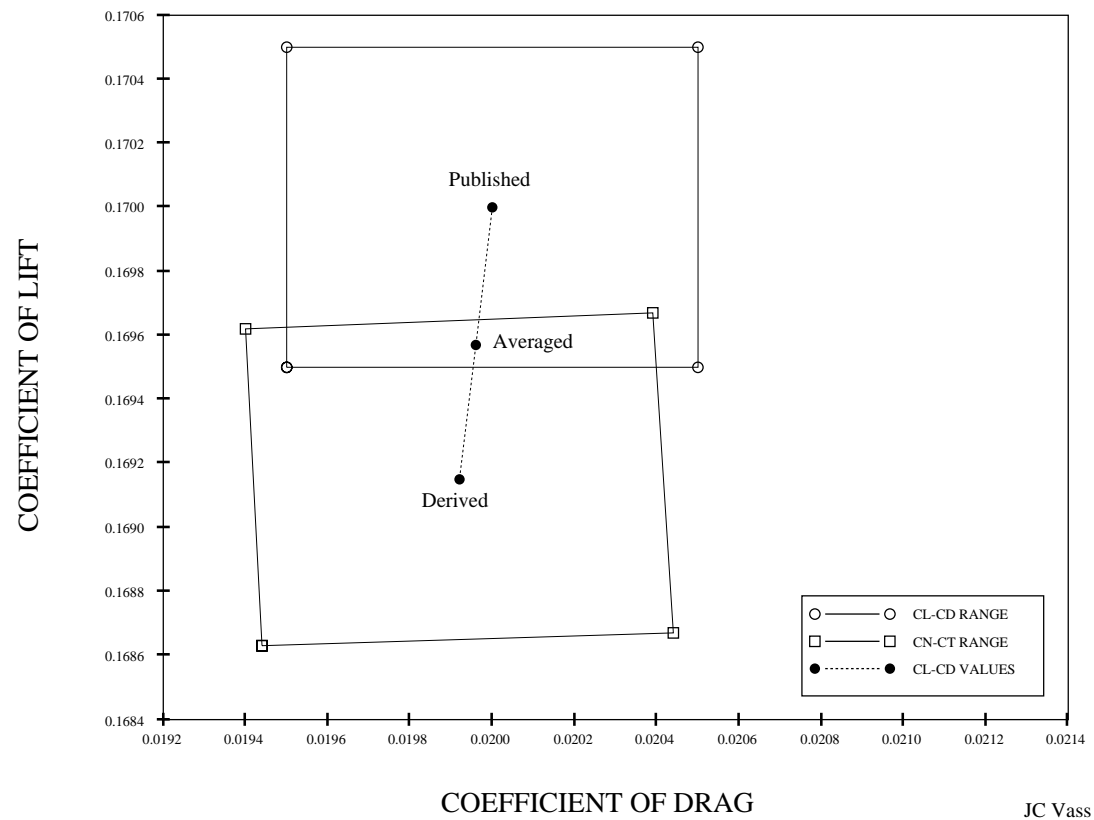AGARD 303: DRAG POLAR DATA ENHANCEMENT

Table 1.1.1.2 , Scan 11 , Alpha = 0.169 deg

COMBINING (C_L, C_D) & (C_N, C_T)

AGARD 303: DRAG POLAR DATA ENHANCEMENT

Table 1.1.1.2 , Scan 1 , Alpha = -2.746 deg

Vassberg, DPW Data Enhancement, Anaheim, CA   *8*
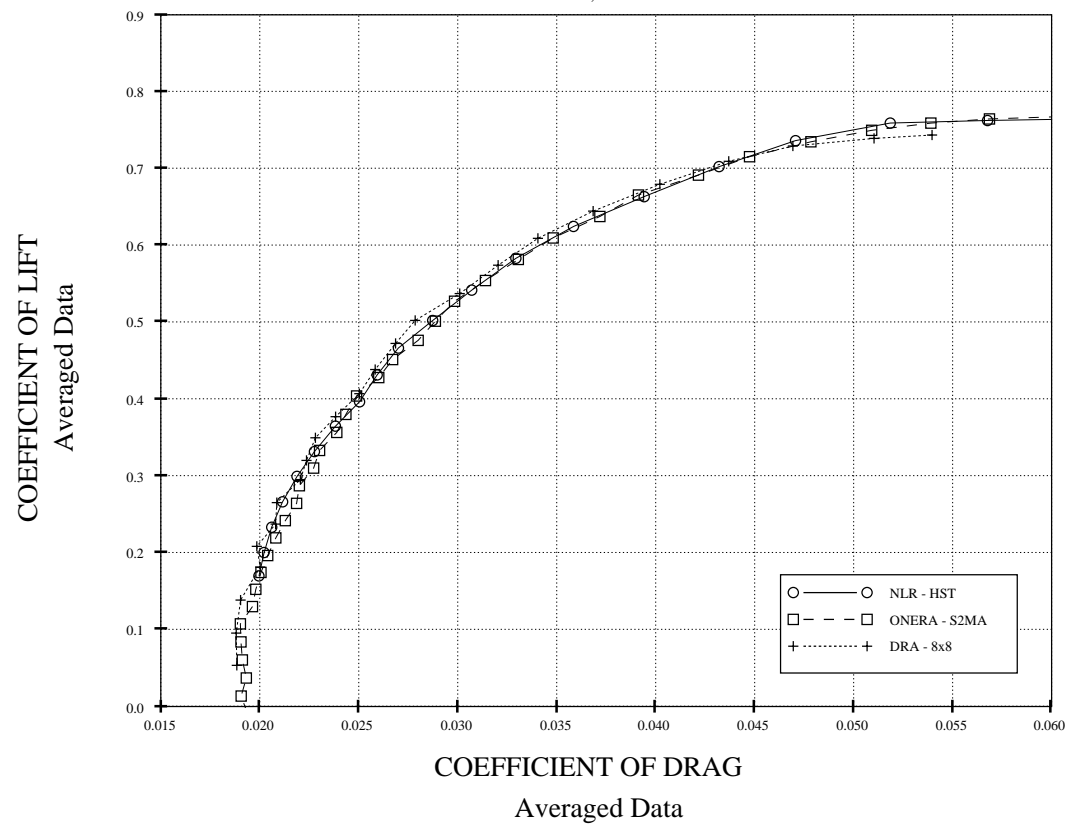
COMBINING (C_L, C_D) & (C_N, C_T)

DLR-F4 WING / BODY GEOMETRY

AGARD Report 303 - Figure 12

Mach = 0.75 , Re = 3 Million

DIGITIZING FIGURE 12

- **PROCESS**
  - Digitized Data on Two Separate Occasions
  - Double Checked Discrepancies
  - Ensured Digitized Drag Within Box Over-Laps
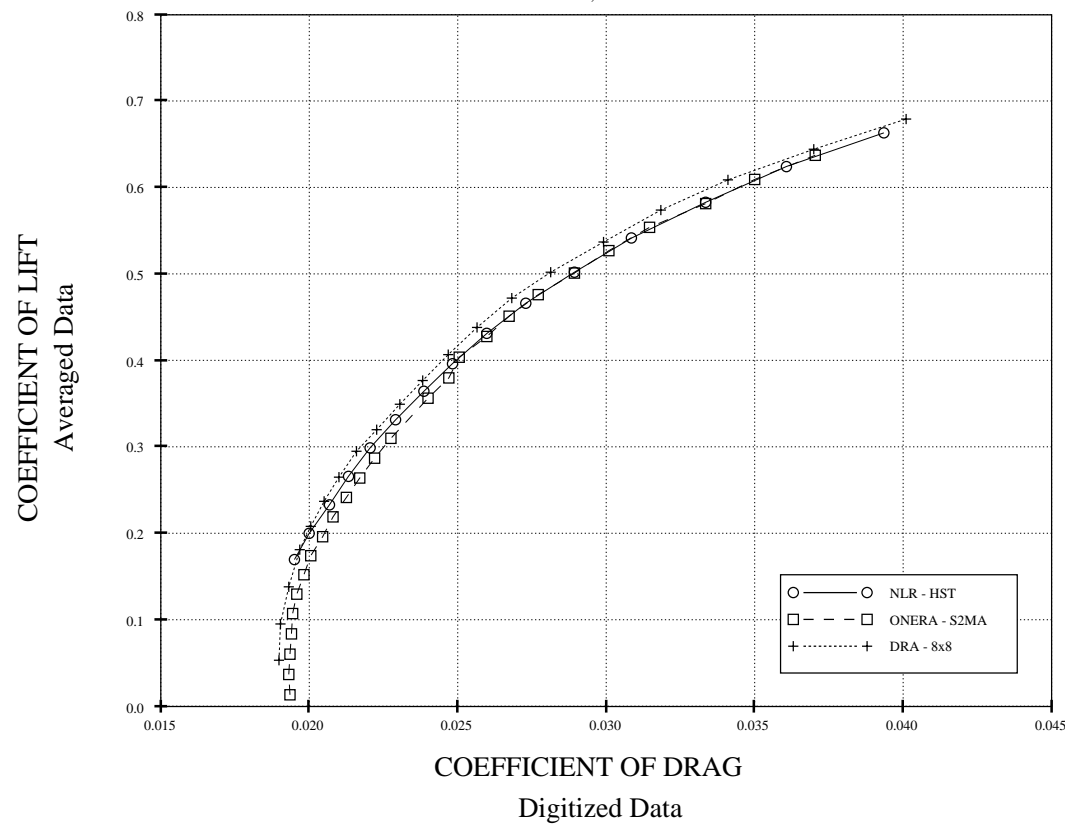
- **UNCERTAINTY NOW IS:** ± 0.00005

- **APPLICABLE ONLY TO** $M = 0.75$ **POLAR**

DIGITIZING FIGURE 12

DLR-F4 WING / BODY GEOMETRY

AGARD Report 303 - Figure 12

Mach = 0.75 , Re = 3 Million

DATA FITTING

Considering Only Test Data in the Range:

$$0.2 \leq C_L \leq 0.55$$

Perform a Least-Squares Fit of the Form:

$$C_D = C_{D0} + \frac{C_L^2}{\pi * e * AR}$$

Here, C_{D0} and e are the free coefficients of the curve fit and the aspect ratio of the DLR-F4 wing is $AR = 9.437262$.

DATA FITTING

DLR-F4 WING / BODY GEOMETRY

AGARD Report 303 Data

Mach = 0.75 , Re = 3 Million