J80-~~247~~ 248

Comment on "Hysteresis Zone or Locus—Aerodynamics of Bulbous Based Bodies at Low Speeds"

Lars E. Ericsson* and J. Peter Reding†
Lockheed Missiles & Space Co., Inc., Sunnyvale, Calif.

THIS Comment serves to clarify statements made by Covert[1] which seem to misrepresent previous work on support interference.[2,3] The results in Figs. 1 and 2 of Ref. 1 were not obtained with a magnetic support system but with a rather bulky, asymmetric support. The figures are Figs. 31 and 32 of Ref. 4. Unfortunately, these figures do not correctly indicate the parameters used in the carpet plots. For clarification, the correct carpet plot for C_m is presented here, together with the needed information about the sting support used in the test[5] (Fig. 1). The flow sketches in the figure illustrate the "wake flipping" to which we ascribe the discontinuous C_m change at $\alpha = 0$ (see Ref. 2).

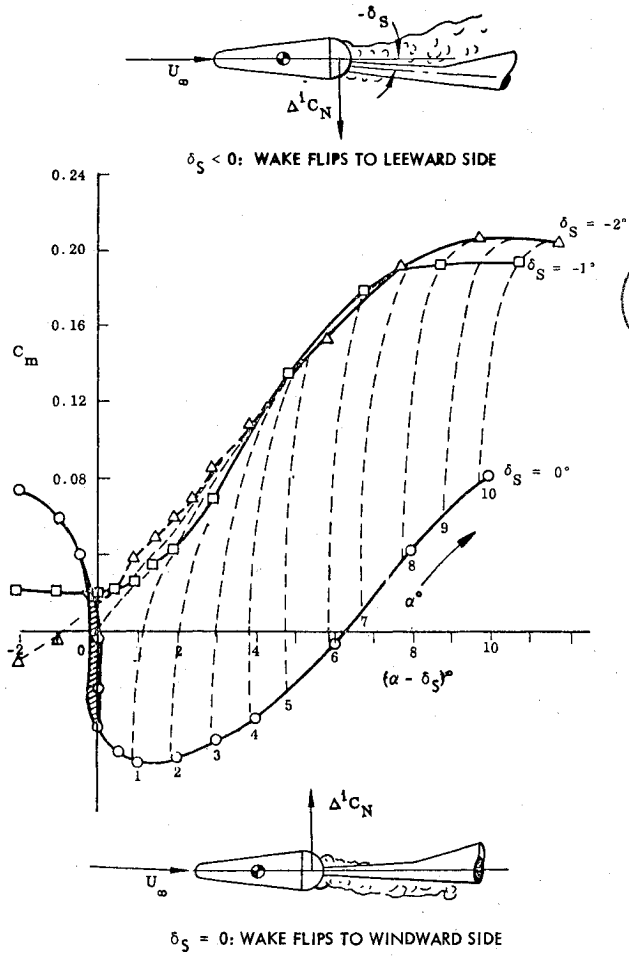

Fig. 1. Measured support interference

The support interference on bulbous bases discussed in Refs. 2 and 3 was due entirely to this discontinuity, ΔC_m. In combination with the convective time lags, ΔC_m produces a "dynamic hysteresis effect" that is proportional to the pitch rate.[3,4] Consequently, the support interference on the measured damping derivative is insensitive to pitch rate for the low reduced frequencies of practical interest [see Eq. (2) of Ref. 2]. Static hysteresis never played any part in the correction of the measurements for support interference. It was only included in the analysis for the sake of completeness [Eq.(3) of Ref. 2].

It is unfortunate that the data scatter region at $\alpha = 0$ in Fig. 1 ever was given the designation "hysteresis." It is not caused by true static hysteresis effects but rather by model vibration. The dynamically destabilizing effect of a bulbous base is maximum at zero angle of attack.[4] It is stated in Ref. 1 that no data could be taken at $\alpha = 0$, because the model motion was excessive.

J 79-004 (TN) no ref

References

[1] Covert, E. E., "Hysteresis Zone or Locus—Aerodynamics of Bulbous Based Bodies at Low Speeds," *AIAA Journal*, Vol. 17, ~~June~~ 1979, pp. 659-661.

[2] Ericsson, L. E. and Reding, J. P., "Viscous Interaction or Support Interference—The Dynamicist's Dilemma," *AIAA Journal*, Vol. 16, April 1978, pp. 363-368.

[3] Reding, J. P. and Ericsson, L. E., "Dynamic Support Interference," *Journal of Spacecraft and Rockets*, Vol. 9, July 1972, pp. 547-553.

[4] Ericsson, L. E. and Reding, J. P., "Aerodynamic Effects of Bulbous Bases," NASA CR-1339, Aug. 1969.

[5] Adcock, J. B., "Some Experimental Relations Between the Static and Dynamic Stability Characteristics of Sting Mounted Cones with Bulbous Bases," *Transactions of the 3rd Technical Workshop on Dynamic Stability Problems*, Paper 5, Vol. II NASA Ames Research Center, Moffett Field, Calif., Nov. 1968.

00001
20007
40005

J80-~~248~~ 249

Reply by Author to L.E. Ericsson and J.P. Reding

Eugene E. Covert*
Massachusetts Institute of Technology, Cambridge, Mass.

I WOULD like to take this opportunity to apologize not only to Drs. Ericsson and Reding, but also to the readers of the journal for the editorial error I made in Ref. 1. The Figs. 1 and 2 that were published were not the correct ones. Those published were in fact due to Ericsson and Reding. The lack of proper citation was due to publication of the incorrect figures. I hope this error did not cause inconvenience.

References

[1] Covert, E.E., "Hysteresis Zone or Locus—Aerodynamics of Bulbous Based Bodies at Low Speeds," *AIAA Journal*, Vol. 17, June 1979, pp. 659-661.

Received Feb. 11, 1980; revision received June 11, 1980.

Index categories; Jets, Wakes and Viscid-Inviscid Flow Interactions; Aerodynamics; LV/M Dynamics and Control.

*Senior Consulting Engineer.
†Staff Engineer.

Received March 6, 1980.

Index categories: Jets, Wakes, and Viscid-Inviscid Flow Interactions; Aerodynamics; LV/M Dynamics and Control.

*Professor and Director, Dept. of Aeronautics and Astronautics. Fellow AIAA.