

Technical Comments

Comment on “Physics of Coanda Jet Detachment at High-Pressure Ratio”

George Emanuel*

University of Oklahoma, Norman, Oklahoma 73019

REFERENCE 1 provides an interesting discussion of Coanda flow for circulation controlled wings, especially when the jet is supersonic. The purpose of this Comment is to point out the close similarity of this type of supersonic jet with that of a free-vortex aerodynamic window. The inviscid

analysis of this later device is summarized in Ref. 2, which also provides additional references. Some of the analytical development in Ref. 1 is contained in Ref. 2, but in a different form and notation. More importantly, Sec. 18.3 of this reference also provides an explicit design procedure for the asymmetric converging/diverging nozzle that generates a free-vortex flow. For the experiments discussed in Ref. 1, this procedure is not used and the initial supersonic flow is only approximately that of a free vortex. Thus, shock waves can develop leading to jet detachment. The procedure described in Ref. 2, however, is exact, aside from wall boundary layers, and should inhibit the formation of downstream shock waves. To the author's knowledge, this design procedure has not been experimentally tried or verified.

References

¹Cornelius, K. C., and Lucius, G. A., “Physics of Coanda Jet Detachment at High-Pressure Ratio,” *Journal of Aircraft*, Vol. 31, No. 3, 1994, pp. 591–596.

²Emanuel, G., *Gasdynamics: Theory and Applications*, AIAA Educational Series, AIAA, New York, 1986, pp. 331–344.

Received July 13, 1994; accepted for publication Dec. 20, 1994.
Copyright © 1995 by the American Institute of Aeronautics and
Astronautics, Inc. All rights reserved.

*Professor, School of Aerospace and Mechanical Engineering, Associate Fellow AIAA.