equations N is too large. Practical experience indicates that the reported nineteen time imputs used by the authors is beyond the safe margin.

Lastly, the model chosen by the authors is suspect, since a finite hollow tube is replaced by a circular hole in an infinite plate. Solutions to the inverse problem indicate that the temperature extrapolation is sensitive. Under the circumstances indicated, a hollow finite walled tube with the outer face regarded as insulated or at a constant temperature would have been more suitable. It would have been very useful had the authors presented a comparison of these models with theirs. Finally, the authors' citation of Ref. 8 is incorrect as it appears. It should be Imber, M. and Khan, J.

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Reply by Author to M. Imber

C.J. Chen*
University of Iowa, Iowa City, Iowa

We would like to thank Professor Imber for taking the interest to comment on our paper. We were well aware of Professor Imber and Dr. Khan's work when we did our project.

We would like first to clarify what we meant by "only one interior probe." By this we mean that in the actual experimental measurement of heat flux to the inner suface of a hollow cylinder, only one probe is needed interior to the cylinder wall. We know that for the problem, the partial differential equation, Eq. (1) of our paper (Ref. 1), requires one initial and two boundary conditions, Eqs. (2-4) of Ref. 1. For our problem, we considered that the initial temperature distribution is uniform and that the two boundary temperatures are given by an interior probe and a probe at the outer surface. For a short time duration in which the temperature at the outer surface does not change we may replace the outer boundary by a larger radius. A practical situation of this type is the gun barrel heating problem where the duration of a shot is only 2 to 5 milliseconds while the temperature at the barrel outer surface does not change for 5 to 10 seconds after the firing.

The reason that we favor only one interior probe is that in practice any probes embedded interior to the cylinder will distort the temperature field and hence create errors in measurement.[2-4] On the other hand, at least one probe must be embedded interior to the cylinder wall to improve the response time and the magnitude of response which is important in the inversion problem. Therefore we conducted all our experiments with only one interior probe and the other probe was located at the outer surface. When the outer probe did not respond we found that we could not apply your Eqs. (8) and (7) (of your Ref. 4) for backward extrapolation. This is why we performed our analysis. Therefore for relatively short times our solution should apply satisfactorily and your analysis may apply only when both probes start to respond.

You are right in pointing out that the matrix associated with the use of our polynomial, Eq. (10), can be nearly singular when the number of equations, N, is too large. We had in our computer code a maximum of $N=20$ with good results. We found that a ten term polynomial is sufficient to give satisfactory results and use of N more than 20 will probably make the inversion of the matrix difficult because of increasing singular behavior as you mentioned.

In all our calculations we always checked the predicted temperature at the outer surface to validate our assumption of constant temperature. Finally we apologize for the typing error in Dr. Khan's name.

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Index categories: LV/M Aerodynamic Heating; Rocket Engine Testing; Heat Conduction.

*Associate Professor, Energy Division, College of Engineering.

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Comment on "Boundary-Layer Transition on Supersonic Cones in an Aeroballistic Range"

A.B. Bailey*
ARO, Inc., Arnold Air Force Station, Tenn.

Potter[1] recently reported on a study of boundary-layer transition on supersonic cones in an aeroballistic range. A conclusion drawn from this investigation is that the local Reynolds number of transition increases with increasing unit Reynolds number. It is the purpose of this Note to show that measurements of the Reynolds number at which full turbulence occurs in the wake of high-speed cones shows a similar variation. The results of two aeroballistic range investigations of transition in the wake[2,3] are compared with Potter's results in Fig. 1. The subscript δ denotes computed body surface or "edge-of-boundary-layer" flow conditions, and the length characterizing transition is axial distance measured from cone apex.The good agreement between these wake and body transition measurements when compared in this manner suggests that they may be related phenomena. Similar effects are present in other aeroballistic range measurements of transition Reynolds numbers.[4-7]

In some of the attempts to correlate wake transition measurements[2-4,7] a Reynolds number based on body diameter has been used as a correlating parameter. A con-

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Index category: Boundary-Layer Stability and Transition.

*Research Engineer, Aerodynamics Project Branch, von Karman Gas Dynamics Facility. Associate Fellow AIAA.

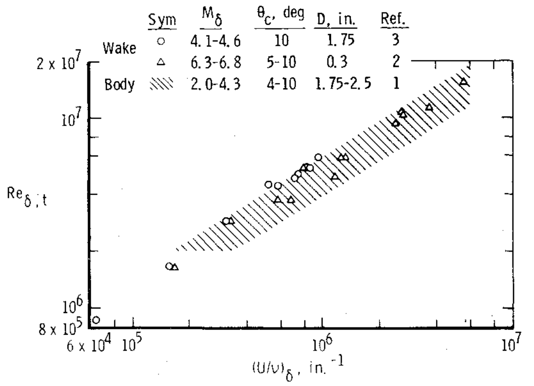

Fig. 1 A comparison of wake and body transition measurements in an aeroballistic range.

sideration of the data presented in Fig. 1 indicates that the aeroballistic range measurements[2,3] would not be in such good agreement if a body rather than a unit Reynolds number were used as a correlating parameter.

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