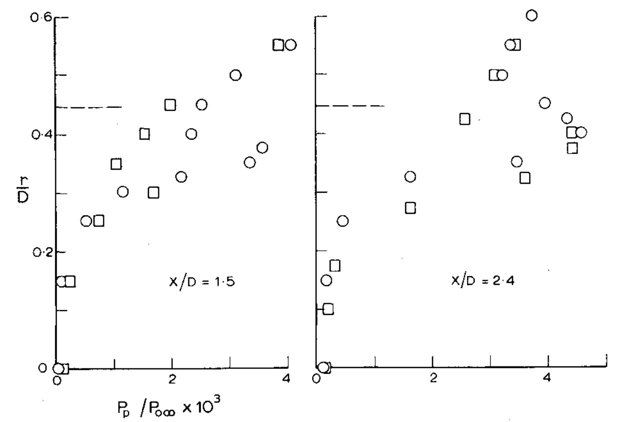

Fig. 2 Pitot pressure profiles (*D* refers to flat-base cone and – – – shows maximum radius of rounded-base cone); □ – flat base; ○ – rounded base.

siderable scatter, but they suggest that some of the advantage of magnetic suspension may be lost unless development of probe support systems includes comprehensive interference tests involving visualization and force measurements. It would be of interest to know whether any similar probe interference problems were experienced with the M.I.T. system.

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Reply by Authors to R.I. Crane

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THE authors express their appreciation to R.I. Crane for bringing our attention to his work (Refs. 1, 2) on measurements in the hypersonic cone near wake. The technical comment by Crane calls attention to the interference to the near-wake flow pattern caused by probe stems inserted into the flowfield. In particular, reference is made to our paper[3] in which measurements of pitot pressure, and the recovery temperature of a cylindrical hot film probe were made in the laminar near-wake of sharp, 7° half-angle, adiabatic wall cones, at $M_\infty = 6.32$ and at freestream Reynolds numbers (based on cone base diameter) of 62,000 to 86,000. These experiments were conducted in a continuous flow hypersonic wind tunnel. This problem of probe-flowfield interference, especially in the wake-neck region, is well-known and has been mentioned by Zakkay and Cresti,[4] and Demetriades and Bauer.[5] Discussion of probe interference was not made in Ref. 3 since this point had been discussed in previous papers.[6-7] The pitot pressure probes used in these investigations, and also in Ref. 3, were glass tubes between 0.007 and 0.013 in outer diameter supported on thin, double-wedge brass stems. The cone base diameter was 0.737 in. The rather small sizes of these probes were carefully chosen to obtain good resolution of the pressure profile at the expense of their associated slow response time. The continuous flow nature of the wind-tunnel enabled the authors to make wake traverses at correspondingly slower speeds.

The pitot pressure profiles presented in Refs. 3, 6, and 7 were obtained in two ways. Firstly, with the double-wedge stem probe support oriented in the vertical plane, the probe was passed through the wake in one direction and then back in the opposite direction. Secondly, the traverses were repeated with the probe stem oriented in the horizontal plane. This procedure was used to obtain wake traverses at axial locations from one-half to about five base diameters. Axial pitot pressure profiles were also recorded with the probe tip on the wake axis. These measurements were also repeated with different probe sizes. In these measurements, it was shown that, with the cone at zero angle of incidence, the results were almost identical (within the limits of experimental error; the uncertainty in the $p_p(p_{o\infty}$ measurement is 0.5%) leading to the conclusion that the probe stem orientation had no effect on the results. A comparison of vertical and horizontal traverses as presented in Ref. 3 is used as a test for both zero incidence and also any probe-flowfield interaction.

Finally, the current through the drag electromagnet of the magnetic suspension was used indirectly to aid the selection of the probe stem dimensions. Estimates showed that the drag force did not change by more than 1% as the probe was moved axially along the wake axis. This also serves to confirm the result that no significant proble-flowfield interference or interaction was present.

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