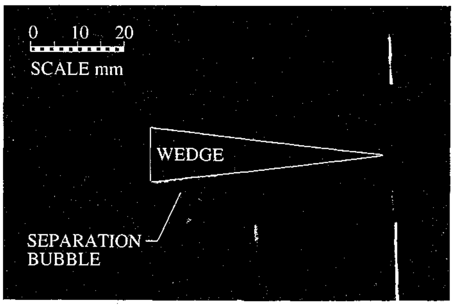

Fig. 4 Flow over a 5.8-deg half-angle wedge with Mach 1.5 nozzle.

Figure 4 shows the 5.8-deg wedge placed 2 mm (0.08 in.) from the exit of the Mach 1.5 nozzle. The shock induced boundary-layer separation occurs at the same location downstream of the nozzle exit as in Fig. 3. This is to be expected since the incident shock wave is produced by the overexpanded jet and is not a function of model position. Here the separation bubble is about 3 mm thick. This strong interaction suggest that the boundary layer on the wedge is laminar.

IV. Conclusion

A flow visualization method suitable for high-speed flows has been demonstrated. The laser light sheet combined with digital imaging provides a capability to resolve flow structure with low-light levels. The images obtained in this study clearly show the extent and location of shock waves as well as boundary-layer interactions. Natural condensation of water vapor was found to provide more than adequate light scattering particles for flow visualization. A flow tracer may need to be injected into flows where stagnation conditions are not conducive to natural condensation. The thermodynamic effect of condensation on the flow must be considered in determining the amount of injection so that local stagnation temperatures are not significantly altered. With appropriate seeding and illumination, the adaptation of the present scheme to an operating compressor rotor using a pulsed laser light source appears promising. Technical details are currently under study.

Acknowledgments

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Errata

Simple Method of Supersonic Flow Visualization Using Watertable

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DURING production of this paper, two figures were switched. Their correct placement and captions are

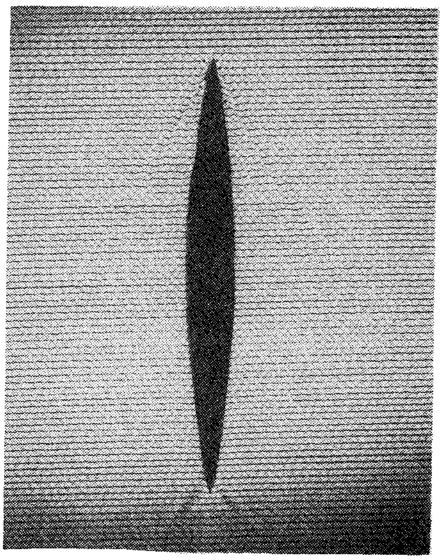

Fig. 2 Symmetric airfoil (maximum thickness 16 mm, chord length 144 mm) at Mach number 2.82.

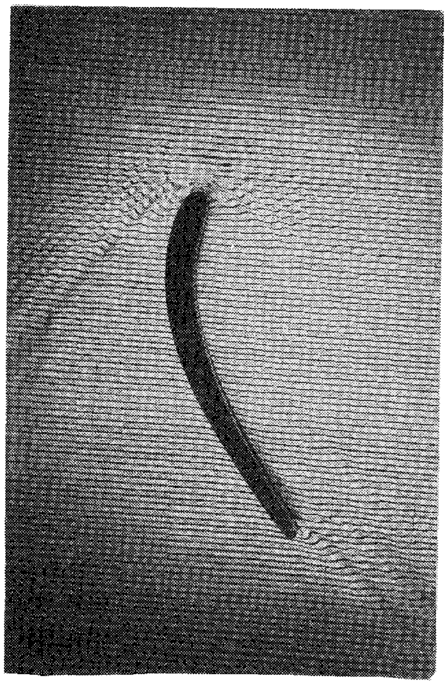

Fig. 3 Cambered airfoil at Mach number 1.86.

AIAA regrets this error.