

DEVELOPMENT OF A MINIATURE DOUBLE PITOT-STATIC PROBE AND ITS APPLICATION TO CALIBRATING BLAST FLOW CONDITIONS

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ABSTRACT

A miniature double Pitot-static probe has been developed for high-fidelity shockwave measurements in blast simulators, shock tubes, and explosive field trials. The probe is 120mm in length and 3mm wide on its support strut made by 3D printing. The small size allows the probe to fit within shock tubes as small as 15cm in cross-section span or directly alongside small targets without obstruction. The probe includes a forward stagnation sensor, a mid static sensor, and a dual-mode aft sensor that can be configured to measure either redundant static pressure or negative-phase stagnation conditions. The three sensors also allow accurate tracking of shock speed which provides a calibration of shock levels through the Rankine-Hugoniot relations. Accurate, multi-parameter measurements of this type are important for qualification of shock-wave flow conditions in blast simulators and are also required to define in-flow boundary conditions for computational modelling of particular experiments.