

CONTROL OF BACK-PRESSURE DURING WIND TUNNEL TESTING OF A TWO DIMENSIONAL RAMJET AIR-INTAKE MODEL

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Abstract

For optimum utilization of available run-time in blowdown wind tunnels, the controls, instrumentation, data acquisition and various other related systems associated with measurements must be efficiently synchronized. Testing of the air-intake model is a typical example where large number of steady and unsteady pressure measurements need to be combined with control of back pressure at the exit plane of the intake. This paper presents the development of a PC-based control system for testing a ramjet air-intake model at supersonic Mach numbers in the 0.3m trisonic wind tunnel at CSIR-National Aerospace Laboratories, Bangalore. The back pressure of the two-dimensional ramjet air intake model was controlled using a rectangular butterfly valve driven by a stepper motor external to the test section. Commands to vary the valve position were programmed in a PC and the valve position acquired from a potentiometer. The motor control and pressure data acquisition were operated in a hand-shake mode to enable hands-off execution of tests and maximize the data throughput from each blowdown.