

MASS-FLOW SIMULATION IN AIR-INTAKE MODELS AT SUBSONIC MACH NUMBERS USING DIFFUSER OF WIND TUNNEL AS PASSIVE EJECTOR

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Abstract

In order to ensure adequate mass-flow rate at low Mach numbers through air-intake models in a blow-down wind tunnel, the diffuser of the wind tunnel was used as a passive ejector. The ejector action was accomplished by interconnecting the exit plane of the intake model to a low-pressure region downstream of the choked second throat of the tunnel. Due to the reduced back-pressure, there was a significant acceleration of the entry flow, as indicated by nearly doubling of the inlet velocity. Measurements indicate that for an aircraft air-intake model, as well as a submerged air-intake model, the maximum mass flow rate achievable through the control plug was accomplished even at the lowest Mach number of 0.30, obviating the need for using an active ejector system.

Keywords: Wind Tunnel Testing, Air-intake Studies, Flow Control, Passive Ejector