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Effect of expansion level on the flow development with sudden expansion at high Mach numbers

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Abstract

This paper reports the experimental investigation results to monitor pressure at the base and the duct's flow development . The study aims to assess the influence of favorable and adverse pressure gradient on the flow growth and control efficacy. The experimental tests were conducted at a fixed level of favorable and unfavorable pressure gradient at the nozzles for Mach 1.25 to 3.0 at various duct lengths. Only a few selected cases are considered as representative of all the possibilities. Results show that when the nozzles are under the impact of a favorable pressure gradient, they marginally affect the duct's flow development . However, when nozzles face an adverse pressure gradient, the

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control acts negatively, resulting in a decline in pressure. Oscillations dominate the flow for the highest pipe length, but the flow becomes smooth for lower duct length. In most cases, flow is not negatively affected by control. © 2021 Elsevier Ltd. All rights reserved.

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Flow Field; Jet State; Sudden Expansion ; Supersonic Mach Numbers ; Wall Pressure

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