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Volume 8, Issue 3, 2019, Pages 457-462

Numerical simulation of suddenly expanded flow at mach 2.2 (Article)

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Abstract

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A numerical simulation has been performed to investigate the control of base pressure with microjets in a suddenly expanded duct. Microjets placed at the pitch circle diameter (PCD) of 13 mm, two micro jets of 1 mm orifice diameter located at 900 for active control. The flow Mach number of the investigation was $M = 2.2$, the L/D ratio of the enlarged duct considered is 6, and the area ratio is 3.24. The convergent-divergent (CD) nozzle geometry has been modeled and simulated employing K- ϵ turbulence model for standard wall function. From the code independently was checked with the commercial computational fluid dynamics software. The numerical simulations carried for nozzle pressure ratio's (NPR) 3, 5, 7, 9 and 11. From the present numerical investigation, it is observed that the NPR, Mach number, and area ratio plays a vital role in fixing the base pressure values. NPR's of the present study is such that the flow mostly remained over expanded. Despite jets being over-expanded the control is effective in decreasing the base suction and hence the base drag. © BEIESP.

SciVal Topic Prominence ⓘ

Topic: Pressure | Nozzles | micro jets

Prominence percentile: 32.217 ⓘ

Author keywords

ISSN: 22498958

Source Type: Journal

Original language: English

Document Type: Article

Publisher: Blue Eyes Intelligence Engineering and Sciences
Publication

References (25)

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