

Document details

[< Back to results](#) | 1 of 1[Export](#) [Download](#) [Print](#) [E-mail](#) [Save to PDF](#) [Add to List](#) [More... >](#)[Full Text](#) [View at Publisher](#)Lecture Notes in Mechanical Engineering
Volume PartF9, 2017, Pages 197-209

Experimental investigation on the effectiveness of active control mechanism on base pressure at low supersonic mach numbers (Article)

Chaudhary, Z.I.^a [✉](#), Shinde, V.B.^{bc}, Bashir, M.^d, Khan, S.A.^e [✉](#) [👤](#)^aDepartment of Mechanical Engineering, Datta Meghe College of Engineering, Airoli, Navi Mumbai, India^bNHITM, Thane, India^cMechanical Engineering, DMCE, Airoli, Navi Mumbai, India[View additional affiliations](#) [v](#)

Abstract

[View references \(15\)](#)

In the current investigation, the experiments were carried out to evaluate the effectiveness of microjets in controlling the base pressure from a convergentdivergent nozzle at low supersonic Mach at different expansion level. Tests were carried out for low supersonic Mach numbers 1.25, 1.3, 1.48, and 1.6 while nozzle pressure ratio ranges from 3 to 11. The jets are augmented abruptly into an axisymmetric circular channel with different cross-sectional areas as that of nozzle exit area. The results show that the proficiency of the microjets is only marginal in controlling the base pressure even under the influence of favorable pressure gradient at lower NPRs namely 3 and 5. It was also observed that for higher values of the NPRs such as 7, 9, and 11, the dynamic control by very small jets results in rise of base pressure for the different values of the L/D ratios of these investigations. For NPRs 5 and 7, the trend differs due to the level of expansion, nature of waves present in the base region, relief available to the flow, length to diameter ratio of the enlarged duct, and the Mach numbers. It is seen that most of the cases exhibit similar behavior for higher as well as the lower length to diameter ratios, which means; that the back pressure has not adversely influenced the flow field in the base region as well as in the duct. With this it can be stated that the microjets can be an alternative for the experimentalist for base pressure control in the form of microjets. © Springer Science+Business Media Singapore 2017.

Author keywords

Abrupt expansion Active control Base pressure Nozzle pressure ratio

ISSN: 21954356

Source Type: Book series

Original language: English

DOI: 10.1007/978-981-10-1771-1_24

Document Type: Article

Publisher: Springer Heidelberg

References (15)

[View in search results format >](#) All [Export](#) [Print](#) [E-mail](#) [Save to PDF](#) [Create bibliography](#)

- 1 Gad-El Hak, M., Pollard, A. (1998) *Flow Control: Fundamentals and Practices. Lecture Notes in Physics*, 53. Cited 112 times. New series m, Monographs, Springer

Metrics [?](#)

0 Citations in Scopus

0 Field-Weighted Citation Impact

PlumX Metrics [v](#)

Usage, Captures, Mentions, Social Media and Citations beyond Scopus.

Cited by 0 documents

Inform me when this document is cited in Scopus:

[Set citation alert >](#)[Set citation feed >](#)

Related documents

Study of effect of flow parameters on base pressure in a suddenly expanded duct at supersonic mach number regimes using CFD and design of experiments

Quadros, J.D. , Khan, S.A. , Antony, A.J. (2018) *Journal of Applied Fluid Mechanics*

Control of suddenly expanded flow at low l/d ratio and high mach numbers

Chaudhary, Z.I. , Shinde, V.B. (2016) *ARPJ Journal of Engineering and Applied Sciences*

Experimental study of suddenly expanded flow from correctly expanded nozzles

Fharukh Ahmed, G.M. , Ullah, M.A. , Khan, S.A. (2016) *ARPJ Journal of Engineering and Applied Sciences*[View all related documents based on references](#)

- 2 Favier, J., Cordier, L., Kourta, A.
On the optimization of flow control actuators

(2007) *Mecanique et Industries*, 8 (3), pp. 259-265. Cited 7 times.
<http://www.edpsciences.org/articles/meca/pdf/2007/03/mi0285-2007.pdf?access=ok>
doi: 10.1051/meca:2007047

[View at Publisher](#)

- 3 Rouméas, M., Gilliéron, P., Kourta, A.
Drag reduction by flow separation control on a car after body

(2009) *International Journal for Numerical Methods in Fluids*, 60 (11), pp. 1222-1240. Cited 36 times.
<http://www3.interscience.wiley.com/cgi-bin/fulltext/121460621/PDFSTART>
doi: 10.1002/flid.1930

[View at Publisher](#)

- 4 Boucinha, V., Magnier, P., Leroy-Chesneau, A., Weber, R., Jousset, R., Dong, B., Hong, D.
Characterization of the ionic wind induced by a sine DBD actuator used for laminar-to-turbulent transition delay

(2008) *4th AIAA Flow Control Conference*, art. no. 2008-4210. Cited 16 times.
ISBN: 978-156347942-7

- 5 Anderson, S.J., Williams, T.J.
Base pressure and noise produced by the abrupt expansion of air in a cylindrical duct
(1968) *Archive Journal of Mechanical Engineering Science 1959-1982 (VOLS 1-23)*, 10 (3), pp. 262-268. Cited 33 times.
JUNE

- 6 Green, S.I.
Fluid vortices

(1995) *Fluid vortices*. Cited 27 times.
ISBN: 0792333764; 978-079233376-0

- 7 Elavarasan, R., Krothapalli, A., Venkatakrishnan, L., Lourenco, L.
Suppression of self-sustained oscillations in a supersonic impinging jet

(2001) *AIAA Journal*, 39 (12), pp. 2366-2373. Cited 37 times.
doi: 10.2514/2.1243

[View at Publisher](#)

- 8 Alvi, F.S., Shih, C., Elavarasan, R., Garg, G., Krothapalli, A.
Control of supersonic impinging jet flows using supersonic microjets

(2003) *AIAA Journal*, 41 (7), pp. 1347-1355. Cited 88 times.
<http://arc.aiaa.org/loi/aiaaj>
doi: 10.2514/2.2080

[View at Publisher](#)

- 9 Khan, S.A., Rathakrishnan, E.
Active control of suddenly expanded flows from overexpanded nozzles

(2002) *International Journal of Turbo and Jet Engines*, 19 (1-2), pp. 119-126. Cited 16 times.

- 10 Khan, S.A., Rathakrishnan, E.
Control of Suddenly Expanded Flows with Micro-Jets

(2003) *International Journal of Turbo and Jet Engines*, 20 (1), pp. 63-81. Cited 13 times.

□ 11 Khan, S.A., Rathakrishnan, E.
Active control of suddenly expanded flows from underexpanded nozzles
(2004) *International Journal of Turbo and Jet Engines*, 21 (4), pp. 233-253. Cited 10 times.

□ 12 Khan, S.A., Rathakrishnan, E.
Control of suddenly expanded flows from correctly expanded nozzles
(2004) *International Journal of Turbo and Jet Engines*, 21 (4), pp. 255-278. Cited 9 times.

□ 13 Khan, S.A., Rathakrishnan, E.
Control of suddenly expanded flow
(2006) *Aircraft Engineering and Aerospace Technology*, 78 (4), pp. 293-309. Cited 9 times.
doi: 10.1108/17488840610675573
[View at Publisher](#)

□ 14 Ashfaq, S., Khan, S.A., Rathakrishnan, E.
Active Control of Flow through the Nozzles at Sonic Mach Number
(2013) *International Journal of Emerging Trends in Engineering and Development*, 2 (3), pp. 73-82. Cited 3 times.

□ 15 Ashfaq, S., Khan, S.A., Rathakrishnan, E.
Control of base pressure with micro jets for area ratio 2.4
(2014) *International Review of Mechanical Engineering*, 8 (1), pp. 1-10. Cited 3 times.
<http://www.praiseworthyprize.com/IREME.htm>

🔍 Chaudhary, Z.I.; Department of Mechanical Engineering, Datta Meghe College of Engineering, Airoli, Navi Mumbai, India; email:zakirilah@gmail.com

© Copyright 2017 Elsevier B.V., All rights reserved.

< Back to results | 1 of 1

^ Top of page

About Scopus

What is Scopus
Content coverage
Scopus blog
Scopus API
Privacy matters

Language

日本語に切り替える
切换到简体中文
切换到繁體中文
Русский язык

Customer Service

Help
Contact us

ELSEVIER

[Terms and conditions](#) [Privacy policy](#)

Copyright © 2018 Elsevier B.V. All rights reserved. Scopus® is a registered trademark of Elsevier B.V.

Cookies are set by this site. To decline them or learn more, visit our [Cookies page](#).

 RELX Group™