Document details

Back to results | 1 of 1

Export Download Print E-mail Save to PDF Add to List More...

Journal of Advanced Research in Fluid Mechanics and Thermal Sciences
Volume 53, Issue 2, 1 January 2019, Pages 194-203

Threaded spikes for bluff body base flow control (Article)

Khan, S.A.[a], Alrobaian, A.A.[b], Asadullah, M.[c], Aswin[d]

[a]Mechanical Engineering Department, Faculty of Engineering, International Islamic University Malaysia, Kuala Lumpur, Malaysia
[b]Mechanical Engineering Department, Qassim University, Buraidah, Saudi Arabia
[c]Mechanical Engineering Department, Research Scholar, International Islamic University Malaysia, Kuala Lumpur, Malaysia

View additional affiliations

Abstract

View references (16)

Although the demand for rockets and missiles has increased exponentially but the problems of the gas dynamics related to these vehicles remains to be a challenge. The main problem is high-pressure associated with the shock wave in front and lowpressure recirculation bubble attached behind the vehicle at the blunt base . This barrier of wave drag due to the shock waves and the drag due to the bubble leads to a huge amount of the fuel consumption and high fluctuations in the flow field of the enlarged duct. This paper focuses mainly on the base drag and experimentally investigated the effect of the passive control in the form of the threaded spikes for bluff bodies as the base flow controller. Two threaded spikes of length 40 mm opposite to each other and attached to a control plate of diameter 80 mm and thickness 1 mm are at pitch circular diameter of 23 mm and slot of 10 mm X 10 mm at the center, placed between the nozzle and the duct to act as the passive controller. The Mach numbers considered for the investigation in the subsonic regime were 0.6, 0.7 and in the transonic regime were 0.8, 0.9 for the enlarged duct cross-sectional area of 625 mm2 and the exit area of the nozzle considered was 100 mm2. The lengths of the enlarged duct were 100 mm, 150 mm and 200 mm. The passive control and regulating the base pressure by threaded spikes were found very efficient without any adverse effect on the flow field of the enlarged duct. © 2019 Penerbit Akademia Baru.

Author keywords

Base flows | Mach number | Threaded spikes | Wall pressure

ISSN: 22897879
Source Type: Journal
Original language: English
Document Type: Article
Publisher: Penerbit Akademia Baru

References (16)

View in search results format

All | Export Print E-mail Save to PDF Create bibliography

1 Viswanath, P.R.
Flow management techniques for base and afterbody drag reduction

(1996) *Progress in Aerospace Sciences*, 32 (2-3), pp. 79-129. Cited 57 times.
doi: 10.1016/0376-0421(95)00003-8

View at Publisher

2 Perry, A.K.
(2016) *"An investigation into the base pressure of simplified automotive squareback geometries."*. Cited 3 times.
PhD diss., © Anna-Kristina Perry

3 Trip, R.
(2016) *"Shedding light on the bluff body wake instability."*
PhD diss., KTH Royal Institute of Technology

4 Prosser, D.T., Smith, M.J.
"Three-dimensional bluff body aerodynamics and its importance for helicopter sling loads."
(2014) *In Proceedings of the 40th European Rotorcraft Forum*. Cited 2 times.
Southampton, UK. Curran Associates Inc

5 Leroy Spearman, M.
Some NACA/NASA aerodynamic research related to security and defense

(2012) *50th AIAA Aerospace Sciences Meeting Including the New Horizons Forum and Aerospace Exposition*, art. no. AIAA 2012-0957.
doi: 10.2514/6.2012-957

View at Publisher

6 Asadullah, M., Khan, S.A., Asrar, W., Sulaeman, E.
Passive control of base pressure with static cylinder at supersonic flow (Open Access)

(2018) *IOP Conference Series: Materials Science and Engineering*, 370 (1), art. no. 012050. Cited 2 times.
http://www.iop.org/EJ/journal/mse
doi: 10.1088/1757-899X/370/1/012050

View at Publisher

7 Soumya, S., Prakash, K.A.
Effect of splitter plate on fluid flow characteristics past a triangular cylinder (Open Access)

(2017) *Journal of Physics: Conference Series*, 822 (1), art. no. 012054. Cited 2 times.
http://www.iop.org/EJ/journal/conf
doi: 10.1088/1742-6596/822/1/012054

View at Publisher

8 Khan, S.A., Asadullah, M., Sadhiq, J.
Passive control of base drag employing dimple in subsonic suddenly expanded flow

(2018) *International Journal of Mechanical and Mechatronics Engineering*, 18 (3), pp. 69-74. Cited 3 times.
http://ijens.org/Vol_18_I_03/181303-5757-IJMME-IJENS.pdf