

# Scopus

## 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

Journal of Wind Engineering and Industrial Aerodynamics  
Volume 134, 2014, Pages 30-43

### Passive drag reduction of square back road vehicles (Article)

Altaf, A., Omar, A.A., Asrar, W.

Mechanical Engineering Department, Kulliyyah of Engineering, International Islamic University Malaysia (IIUM), Jalan Gombak, Kuala Lumpur, Malaysia

#### Abstract

[View references \(13\)](#)

Bluff body vehicles such as trucks and buses do not have a streamlined shapes and hence have high drag which can be reduced to make great savings in operational cost. While rectangular flaps have been widely studied as both passive add-ons and in active drag reducing systems for bluff bodies, changing the basic geometry of the flap has not been explored in literature. In this work, a baseline drag value is obtained for a simplified MAN TGX series truck in a CFD software, and the drag reduction of a proposed elliptically shaped flap is compared to aerodynamically equivalent rectangular flaps. The optimal mounting angle for both flaps is found to be 50°. A parametric study of changing the ellipse semi-major axis is carried out to find the optimal length for drag reduction. A maximum drag reduction of 11.1% is achieved using an elliptical flap with 0.12. m semi-major axis; compared to 6.37% for a length equivalent rectangular flap, and 6.84% for a surface area equivalent rectangular flap. Results of the pressure distribution and velocity flow behind the rear of the truck are also given and analyzed. © 2014.

#### Author keywords

Bluff body CFD Elliptic flaps Passive drag reduction Road vehicles

#### Indexed keywords

Engineering controlled terms: Automobile bodies Computational fluid dynamics Drag reduction Flaps Geometry  
Roads and streets Trucks Vehicles

- Bluff body
- CFD softwares
- Maximum drag reductions
- Mounting angles
- Parametric study
- Reducing systems
- Road vehicles
- Semimajor axis

Engineering main heading: Drag

#### Metrics [View all metrics >](#)

4 Citations in Scopus  
40th Percentile  
0.31 Field-Weighted Citation Impact



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

#### Cited by 4 documents

Numerical investigation of flow around a 3D bluff body using deflector plate  
Raina, A. , Harmain, G.A. , Haq, M.I.U.  
(2017) *International Journal of Mechanical Sciences*

Aerodynamic drag reduction and flow control of Ahmed body with flaps  
Tian, J. , Zhang, Y. , Zhu, H.  
(2017) *Advances in Mechanical Engineering*

Flow around an articulated lorry model  
Lo, K.H. , Kontis, K.  
(2017) *Experimental Thermal and Fluid Science*

[View all 4 citing documents](#)

Inform me when this document is cited in Scopus:

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

#### Related documents

Does an active adjustment of aerodynamic drag make sense?  
Maciejewski, M.

ISSN: 01676105  
 Source Type: Journal  
 Original language: English

DOI: 10.1016/j.jweia.2014.08.006  
 Document Type: Article  
 Publisher: Elsevier

(2016) *IOP Conference Series: Materials Science and Engineering*

Aerodynamic drag reduction and flow control of Ahmed body with flaps

Tian, J. , Zhang, Y. , Zhu, H.  
 (2017) *Advances in Mechanical Engineering*

Shaping the future of road haulage trailer design

Bukowski, A. , Twigg, P. , Walker, G.  
 (2011) *Measurement and Control*

View all related documents based on references

Find more related documents in Scopus based on:

Authors > Keywords >

## References (13)

View in search results format >

All  Export  Print  E-mail  Save to PDF  Create bibliography

- 1 Ahmed, S.R., Ramm, G., Faitin, G.  
 (1984) *Some Salient Features of the Time - Averaged Ground Vehicle Wake*. Cited 180 times.  
 (SAE-TP-840300), Society of Automotive Engineers, Inc., Warrendale, PA

- 2 Beaudoin, J.-F., Aider, J.-L.  
 Drag and lift reduction of a 3D bluff body using flaps

(2008) *Experiments in Fluids*, 44 (4), pp. 491-501. Cited 59 times.  
 doi: 10.1007/s00348-007-0392-1

View at Publisher

- 3 Bruneau, C.H., Creusé, E., Depeyras, D., Gilliéron, P., Mortazavi, I.  
 Active and passive flow control around simplified ground vehicles

(2012) *Journal of Applied Fluid Mechanics*, 5 (1), pp. 89-93. Cited 6 times.  
[http://www.jafmonline.net/modules/journal/journal\\_download.php?Ejsrclid=1a2a749d814f81c502a0ac65dbd40cf1](http://www.jafmonline.net/modules/journal/journal_download.php?Ejsrclid=1a2a749d814f81c502a0ac65dbd40cf1)

- 4 Fourrié, G., Keirsbulck, L., Labraga, L., Gilliéron, P.  
 Bluff-body drag reduction using a deflector

(2011) *Experiments in Fluids*, 50 (2), pp. 385-395. Cited 28 times.  
 doi: 10.1007/s00348-010-0937-6

View at Publisher

- 5 Ha, J., Jeong, S., Obayashi, S.  
 Drag reduction of a pickup truck by a rear downward flap

(2011) *International Journal of Automotive Technology*, 12 (3), pp. 369-374. Cited 13 times.  
 doi: 10.1007/s12239-011-0043-7

View at Publisher

- 6 Hinterberger, C., Garcia-Villalba, M., Rodi, W.  
 Large eddy simulation of flow around the Ahmed body.  
 (2004) *The aerodynamics of heavy vehicles: trucks, buses, and trains*.

- 7 Hsu, F.-H., Davis, R.L.  
 Drag reduction of Tractor-trailers using optimized add-on devices

(2010) *Journal of Fluids Engineering, Transactions of the ASME*, 132 (8), art. no. 084504. Cited 12 times.  
<http://scitation.aip.org/getpdf/servlet/GetPDFServlet?filetype=pdf&id=JFEGA4000132000008084504000001&idtype=cvips&prog=normal>  
 doi: 10.1115/1.4001587

View at Publisher

- 8 Lee, T., Ko, L.S.  
PIV investigation of flowfield behind perforated Gurney-type flaps  
  
(2009) *Experiments in Fluids*, 46 (6), pp. 1005-1019. Cited 16 times.  
doi: 10.1007/s00348-008-0606-1  
  
View at Publisher
- 
- 9 Leuschen, J., Cooper, K.R.  
Summary of full-scale wind tunnel tests of aerodynamic drag-reducing devices for tractor-trailers  
  
(2009) *Lecture Notes in Applied and Computational Mechanics*, 41, pp. 451-462. Cited 6 times.  
doi: 10.1007/978-3-540-85070-0-41  
  
View at Publisher
- 
- 10 (2011) *Euro 5 Spec Sheets - TGX 6x4 tractor Chassis Specification*.
- 
- 11 (2010) *Transport Statistics Malaysia*.. Cited 6 times.  
Retrieved May 29, 2013, from.  
<http://www.mot.gov.my/my/Publication/Official/Statistik%20Pengangkutan%20Malaysia%202010.pdf>
- 
- 12 Mohamed-Kassim, Z., Filippone, A.  
Fuel savings on a heavy vehicle via aerodynamic drag reduction  
  
(2010) *Transportation Research Part D: Transport and Environment*, 15 (5), pp. 275-284. Cited 30 times.  
doi: 10.1016/j.trd.2010.02.010  
  
View at Publisher
- 
- 13 Nayeri, C.N., Haff, J., Greenblatt, D., Loefdahl, L., Paschereit, C.O.  
Drag reduction on a generic tractor-trailer using active flow control in combination with solid flaps  
  
(2009) *Lecture Notes in Applied and Computational Mechanics*, 41, pp. 179-191. Cited 5 times.  
doi: 10.1007/978-3-540-85070-0-14  
  
View at Publisher

Altaf, A.; Mechanical Engineering Department, Kulliyah of Engineering, International Islamic University Malaysia (IIUM), Jalan Gombak, Kuala Lumpur, Malaysia; email:alamaan@gmail.com  
© Copyright 2016 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

