

Full Text from Publisher

Find PDF

Export...

Add to Marked List

## Unsteady Boundary Layer Flow over a Sphere in a Porous Medium

By: **Mohammad, NF** (Mohammad, Nurul Farahain)<sup>[1]</sup>; **Waini, I** (Waini, Iskandar)<sup>[2]</sup>; **Kasim, ARM** (Kasim, Abdul Rahman Mohd)<sup>[3]</sup>; **Majid, NA** (Majid, Nurazleen Abdul)<sup>[1]</sup>

[View Web of Science ResearcherID and ORCID](#)

PROCEEDINGS OF THE 24TH NATIONAL SYMPOSIUM ON MATHEMATICAL SCIENCES (SKSM24): MATHEMATICAL SCIENCES EXPLORATION FOR THE UNIVERSAL PRESERVATION

Edited by: **Salleh, Z**; **Hasni, R**; **Rudrusamy, G**; **Lola, MS**; **Salleh, H**; **Rahim, HA**; **AbdJalil, M**

Book Series: AIP Conference Proceedings

Volume: 1870

Article Number: UNSP 040076

DOI: 10.1063/1.4995908

Published: 2017

Document Type: Proceedings Paper

### Conference

Conference: 24th National Symposium on Mathematical Sciences (SKSM)

Location: Univ Malaysia Terengganu, Sch Informat & Appl Math, MALAYSIA

Date: SEP 27-29, 2017

Sponsor(s): Malaysian Math Sci Soc

### Abstract

This study focuses on the problem of unsteady boundary layer flow over a sphere in a porous medium. The governing equations which consists of a system of dimensional partial differential equations is applied with dimensionless parameter in order to attain non-dimensional partial differential equations. Later, the similarity transformation is performed in order to attain nonsimilar governing equations. Afterwards, the nonsimilar governing equations are solved numerically by using the Keller-Box method in Octave programme. The effect of porosity parameter is examined on separation time, velocity profile and skin friction of the unsteady flow. The results attained are presented in the form of table and graph.

### Keywords

KeyWords Plus: [NATURAL-CONVECTION](#); [FLUID](#)

### Author Information

Reprint Address: Mohammad, NF (reprint author)

+ Int Islamic Univ Malaysia, Dept Computat & Theoret Sci, Kulliyah Sci, Kuantan 25200, Pahang, Malaysia.

#### Addresses:

+ [ 1 ] Int Islamic Univ Malaysia, Dept Computat & Theoret Sci, Kulliyah Sci, Kuantan 25200, Pahang, Malaysia

+ [ 2 ] Univ Tekn Malaysia Melaka, Fac Engn Technol, Durian Tunggal 76100, Melaka, Malaysia

+ [ 3 ] Univ Malaysia Pahang, Fac Ind Sci & Technol, Appl & Ind Math Res Grp, Ump Kuantan 26300, Pahang, Malaysia

E-mail Addresses: [farahain@iium.edu.my](mailto:farahain@iium.edu.my); [iskandarwaini@utem.edu.my](mailto:iskandarwaini@utem.edu.my); [rahmanmohd@ump.edu.my](mailto:rahmanmohd@ump.edu.my); [nurazleen.abdulmajid@gmail.com](mailto:nurazleen.abdulmajid@gmail.com)

### Funding

Funding Agency	Grant Number
MOHE	RAGS15-067-0130
International Islamic University Malaysia	RIGS16-092-0256

[View funding text](#)

### Publisher

AMER INST PHYSICS, 2 HUNTINGTON QUADRANGLE, STE 1N01, MELVILLE, NY 11747-4501 USA

### Citation Network

In Web of Science Core Collection

0

Times Cited

Create Citation Alert

19

Cited References

[View Related Records](#)

### Use in Web of Science

Web of Science Usage Count

0

Last 180 Days

0

Since 2013

[Learn more](#)

This record is from:  
Web of Science Core Collection

- Conference Proceedings Citation Index-Science

#### Suggest a correction

*If you would like to improve the quality of the data in this record, please suggest a correction.*

## Categories / Classification

Research Areas: Mathematics; Physics

Web of Science Categories: Mathematics, Applied; Physics, Applied

## See more data fields

◀ 2 of 3 ▶

## Cited References: 19

Showing 19 of 19 [View All in Cited References page](#)

(from Web of Science Core Collection)

- Mixed convection boundary layer flow from a vertical flat plate embedded in a porous medium filled with nanofluids** Times Cited: **161**  
By: Ahmad, Syakila; Pop, Ioan  
INTERNATIONAL COMMUNICATIONS IN HEAT AND MASS TRANSFER Volume: 37 Issue: 8 Pages: 987-991 Published: OCT 2010
- Unsteady MHD Mixed Convection Flow with Heat and Mass Transfer over a Vertical Plate in a Micropolar Fluid-Saturated Porous Medium** Times Cited: **10**  
By: Aurangzaib; Kasim, A. R. M.; Mohammad, N. F.; et al.  
JOURNAL OF APPLIED SCIENCE AND ENGINEERING Volume: 16 Issue: 2 Pages: 141-150 Published: 2013
- Flow of a Newtonian fluid past an impervious sphere embedded in a porous medium** Times Cited: **18**  
By: Barman, B  
INDIAN JOURNAL OF PURE & APPLIED MATHEMATICS Volume: 27 Issue: 12 Pages: 1249-1256 Published: DEC 1996
- Non-similar Solution for Natural Convective Boundary Layer Flow Over a Sphere Embedded in a Porous Medium Saturated with a Nanofluid** Times Cited: **64**  
By: Chamkha, Ali; Gorla, Rama Subba Reddy; Ghodeswar, Kaustubh  
TRANSPORT IN POROUS MEDIA Volume: 86 Issue: 1 Pages: 13-22 Published: JAN 2011
- DEVELOPMENT OF POROUS-MEDIA THEORIES - A BRIEF HISTORICAL REVIEW** Times Cited: **15**  
By: DEBOER, R  
TRANSPORT IN POROUS MEDIA Volume: 9 Issue: 1-2 Pages: 155-164 Published: OCT 1992
- Flow past a sphere buried in a porous media: concentration boundary layer thickness** Times Cited: **1**  
By: Delgado, J.M.P.Q.; Vazquez da Silva, M.  
Diffusion Foundations Volume: 3 Pages: 41-59 Published: 2015
- THE NATURE OF FLOWS THROUGH POROUS-MEDIA** Times Cited: **76**  
By: DURST, F; HAAS, R; INTERTHAL, W  
JOURNAL OF NON-NEWTONIAN FLUID MECHANICS Volume: 22 Issue: 2 Pages: 169-189 Published: JAN 1987
- BOUNDARY-CONDITIONS FOR DARCY FLOW THROUGH POROUS-MEDIA** Times Cited: **42**  
By: HABER, S; MAURI, R  
INTERNATIONAL JOURNAL OF MULTIPHASE FLOW Volume: 9 Issue: 5 Pages: 561-574 Published: 1983
- Steady and unsteady boundary layers due to a stretching vertical sheet in a porous medium using Darcy-Brinkman equation model** Times Cited: **22**  
By: Ishak, A.; Nazar, R.; Pop, I.  
International Journal of Applied Mechanics and Engineering Volume: 11 Issue: 3 Pages: 623-37 Published: 2006
- MHD Mixed Convection Flow of Viscoelastic Fluid Embedded in Porous Medium** Times Cited: **1**  
By: Kasim, A. R. M.; Mohammad, N. F.; Aurangzaib; et al.  
MALAYSIAN JOURNAL OF FUNDAMENTAL AND APPLIED SCIENCES Volume: 9 Issue: 1 Pages: 22-27 Published: JAN-MAR 2013
- Title: [not available] Times Cited: **8**  
By: Kasim, A. R. M.; Mohammad, N. F.; Anwar, I.; et al.  
Recent Adv. Math. Pages: 182-189 Published: 2013  
[\[Show additional data\]](#)

12. **UNSTEADY MHD MIXED CONVECTION STAGNATION-POINT FLOW IN A MICROPOLAR FLUID ON A VERTICAL SURFACE IN A POROUS MEDIUM WITH Soret AND Dufour Effects** Times Cited: 3  
By: Kasim, Aurangzaib A. R. M.; Mohammad, N. F.; Shafie, Sharidan  
HEAT TRANSFER RESEARCH Volume: 44 Issue: 7 Pages: 603-620 Published: 2013
13. **CONJUGATE CONVECTION FROM A SPHERE IN A POROUS-MEDIUM** Times Cited: 11  
By: KIMURA, S; POP, J  
INTERNATIONAL JOURNAL OF HEAT AND MASS TRANSFER Volume: 37 Issue: 14 Pages: 2187-2192 Published: SEP 1994
14. Title: [not available] Times Cited: 32  
By: Nield, D. A.; Bejan, A.  
Convection in Porous Media Published: 2013  
Publisher: Springer, New York
15. **Mixed convection boundary layer flow about a solid sphere with Newtonian heating** Times Cited: 12  
By: Salleh, M. Z.; Nazar, R.; Pop, I.  
ARCHIVES OF MECHANICS Volume: 62 Issue: 4 Pages: 283-303 Published: 2010
16. **Unsteady forced and natural convection around a sphere immersed in a porous medium** Times Cited: 9  
By: Sano, T  
JOURNAL OF ENGINEERING MATHEMATICS Volume: 30 Issue: 5 Pages: 515-525 Published: SEP 1996
17. **Numerical study of forced convection flow and heat transfer of a nanofluid flowing inside a straight circular pipe filled with a saturated porous medium** Times Cited: 6  
By: Saryazdi, A. Baqaie; Talebi, F.; Armaghani, T.; et al.  
EUROPEAN PHYSICAL JOURNAL PLUS Volume: 131 Issue: 4 Pages: 1-11 Article Number: 78 Published: APR 4 2016
18. **Numerical solution of mixed convection flow about a sphere in a porous medium saturated by a nanofluid: Brinkman model** Times Cited: 5  
By: Tham, L; Nazar, R.  
J Sci Technol Volume: 4 Pages: 35-46 Published: 2012
19. **NATURAL-CONVECTION ABOUT A HEATED SPHERE IN A POROUS-MEDIUM** Times Cited: 20  
By: YAMAMOTO, K  
JOURNAL OF THE PHYSICAL SOCIETY OF JAPAN Volume: 37 Issue: 4 Pages: 1164-1166 Published: 1974

Showing 19 of 19 [View All in Cited References page](#)

