

CONTENTS

Research Articles

- Mathematical model for the ciliary-induced transport of seminal liquids through the *ductuli efferentes* 1750031
A. A. Farooq and A. M. Siddiqui
- Modeling and analysis of a predator-prey system with time delay 1750032
W. Liu and Y. Jiang
- Simulations of a logistic-type model with delays for Chagas disease with insecticide spraying 1750033
N. Al-Asuoad, T. Pleasant, M. Shillor, H. Munugala, D. J. Coffield Jr. and A. M. Spagnuolo
- Diagnosis of blood cancer using Markov chain Monte Carlo trace model 1750034
K. Vaikundamoorthy
- Dynamical behaviors of a general humoral immunity viral infection model with distributed invasion and production 1750035
A. M. Elaiw, N. H. AlShamrani and K. Hattaf
- The pulse vaccination effects in mammary carcinoma 1750036
C. Aboura, T. M. Touaoula and M. Aribi
- Global stability results for models of commensalism 1750037
P. Georgescu, D. Marin and H. Zhang
- Global stability of an age-structured SVEIR epidemic model with waning immunity, latency and relapse 1750038
L. Liu and X. Liu

(Continued)

Covered in Science Citation Index Expanded (also known as SciSearch®), Journal Citation Reports/Science Edition, Biological Abstracts, BIOSIS Previews

CONTENTS — (Continued)

International Journal of Biomathematics
Vol. 10, No. 3 (2017) 1750031 (17 pages)
© World Scientific Publishing Company
DOI: 10.1142/S1793524517500310

- Optimizing the delivery of combination therapy for tumors:
A mathematical model 1750039
C. R. Rodríguez and J. Belmonte-Beitia
- Dynamics of delayed stochastic predator–prey models with
feedback controls based on discrete observations 1750040
D. Zhao and S. Yuan
- Terminal sliding mode control with self-tuning for coronary
artery system synchronization 1750041
Z. Zhao, X. Li, J. Zhang and Y. Pei
- Symmetry and conservation laws for tuberculosis model 1750042
M. B. Matadi
- An extended Fibonacci sequence associated with the discrete
hungry Lotka–Volterra system 1750043
M. Shinjo, K. Akaiwa, M. Iwasaki and Y. Nakamura
- Bogdanov–Takens bifurcation with codimension three of a
predator–prey system suffering the additive Allee effect 1750044
Y. Liu, Z. Liu and R. Wang
- Long-term behavior of positive solutions of an exponentially
self-regulating system of difference equations 1750045
N. Psarros, G. Papaschinopoulos and K. B. Papadopoulos

Mathematical model of seminal liquid flow

A. A. I. ...
*D ...
COMSATS ...
Tobe ...
†Department of Mathematics ...
York University ...
Toronto ...

This study describes the consequent flow of seminal liquid through the ductus deferens as a couple stress fluid in a two-dimensional flow through a curved tube in the form of a metachronal wave. The partial differential equations governing the flow are solved by utilizing the long wave approximation. Exact solutions for the velocity, stream function and the metachronal wave are obtained. Special attention is given to the cilia motility. The efficiency to transport a couple stress fluid is compared with the theoretical results for the couple stress fluid reported by [T. J. Lardner, *Journal of Applied Physics* **34** (1972) 325–335]. The analytical results show that the efficiency is higher for the couple stress fluid than for the Newtonian fluid.

Keywords: Ciliary-induced flow, couple stress fluid, tube.

Nomenclature

- h : Wavy wall of cilia
 η : Transverse coordinate
 p : Pressure
 a : Mean radius of the tube
 λ : Wavelength
 α : Measure of the eccentricity
 ψ : Stream function