



University of  
**Salford**  
MANCHESTER

# Peristaltic flow of non-Newtonian, compressible fluid with non-zero boundary slip

Tsiklauri, D, Christian, JM and McDonald, GS

<b>Title</b>	Peristaltic flow of non-Newtonian, compressible fluid with non-zero boundary slip
<b>Authors</b>	Tsiklauri, D, Christian, JM and McDonald, GS
<b>Type</b>	Conference or Workshop Item
<b>URL</b>	This version is available at: <a href="http://usir.salford.ac.uk/id/eprint/18433/">http://usir.salford.ac.uk/id/eprint/18433/</a>
<b>Published Date</b>	2006

USIR is a digital collection of the research output of the University of Salford. Where copyright permits, full text material held in the repository is made freely available online and can be read, downloaded and copied for non-commercial private study or research purposes. Please check the manuscript for any further copyright restrictions.

For more information, including our policy and submission procedure, please contact the Repository Team at: [usir@salford.ac.uk](mailto:usir@salford.ac.uk).

## **Peristaltic Flow of Non-Newtonian, Compressible Fluid with Non-zero Boundary Slip**

D. Tsiklauri, J. M. Christian, G. S. McDonald

Joule Physics Laboratory, Institute for Materials Research, School of Computing, Science and Engineering,  
University of Salford, Greater Manchester, M5 4WT

Symposium: Process Modeling & Simulation Using Computational Techniques

In Tsiklauri & Beresnev, *Phys Rev E* 64, 036303 (2001), we investigated new phenomena brought about into the classic peristaltic mechanism by the inclusion of non-Newtonian effects based on the model of a Maxwell fluid. In Tsiklauri, *J Acoust Soc Am* 112, 843 (2002), the effect of nonzero boundary slip velocity in fluid-saturated porous media was studied. Here we present a new advanced model of peristaltic flow which includes all relevant physical effects such as: non-zero boundary slip, non-Newtonian effects, and compressibility. Based on this model, the backflow (reflux) effect is also investigated which is a likely cause of vesico-ureteral reflux in urology. This study was motivated by the recent discovery of boundary slip Craig et al., *Phys Rev Lett* 87, 054504 (2001). The present work is the most general model of peristalsis created to date with wide-ranging applications in biological, geophysical and industrial fluid dynamics.