

## **THERMALLY INDUCED FLOW BETWEEN TWO ECCENTRIC MICRO-CYLINDERS**

Xiao-Jun Gu\* and David R. Emerson

STFC Scientific Computing Department, Warrington WA4 4AD, United Kingdom

\*Correspondence author. Fax: +44 1925 603634 Email: [xiaojun.gu@stfc.ac.uk](mailto:xiaojun.gu@stfc.ac.uk)

**ABSTRACT** In this study, we have investigated the thermally induced flow between two eccentric micro-cylinders in the slip and early transition regime. In comparison with available kinetic data, the computed results from the regularised 26 moment equations are validated up to a Knudsen number of 0.3 in terms of the force acting on the inner cylinder and the thermal energy transmitted between the two cylinders. The contributions to the resultant force from the pressure, normal and shear stress are analysed and we show that the Navier-Stokes-Fourier equations with velocity-slip and temperature-jump boundary conditions cannot predict the force direction correctly, even in the slip regime. A further observation is that the collision models have a significant impact on thermally induced problems, particularly regarding the value of the Prandtl number.