

Heat transfer in micro devices packaged in partial vacuum

Anirudh Rana¹, Manuel Torrilhon², Henning Struchtrup¹

¹ Department of Mechanical Engineering, University of Victoria,
Victoria BC, Canada

² Department of Mathematics, RWTH Aachen University, Aachen,
Germany

E-mail: anirudh@uvic.ca

Abstract

The influence of rarefaction effects on technical processes is studied numerically for a heat transfer problem in a rarefied gas, a box with bottom heated plate. Solutions obtained from several macroscopic models, in particular the classical Navier-Stokes-Fourier equations with jump and slip boundary conditions, and the regularized 13 moment (R13) equations [Struchtrup & Torrilhon, Phys. Fluids 15, 2003] are compared. The R13 results show significant flow patterns which are not present in the classical hydrodynamic description.