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Conjugate thermal creep flow with hydrodynamics and thermal slip conditions in a slit microchannel IAN MONSIVAIS, Facultad de Ingeniería, Universidad Nacional Autónoma de México, México, D. F., 04510, México, JOSÉ LIZARDI, Programa de Energía, Universidad Autónoma de la Ciudad de México, México, D. F., 06720, México, FEDERICO MÉNDEZ, Facultad de Ingeniería, Universidad Nacional Autónoma de México, México, D. F., 04510, México — In this work, we study the conjugate heat transfer between a gas flow and the walls of the microchannel, when the laminar motion of the fluid is caused uniquely by the thermal creep effect on the lower wall. Taking into account that this can represent a microchip or a similar device over which occurs a well defined heat dissipation rate; in our case, we have assumed that the bottom face of this lower wall with finite thermal conductivity, is exposed to a uniform heat flux. On the other hand, the upper wall of the microchannel is subject to a well-known prescribed thermal boundary condition. The heat conduction equation for the lower wall and the mass, momentum and energy equations for the phase gas together with the corresponding boundary conditions are written in dimensionless form, assuming that the Reynolds number associated with the characteristic velocity of the thermal creep and the aspect ratio of the microchannel are both very small. The velocity and temperature fields for the gas phase and the temperature profiles for the lower solid wall are predicted as functions of the involved dimensionless parameters and the main results confirm that the phenomenon of conjugate thermal creep exists whenever the temperature of the lower wall varies linearly or nonlinearly.

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