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Longitudinal Heat Conduction Effects on a Conjugate Thermal Creep Flow in a Microchannel IAN MONSIVAIS, Universidad Nacional Autónoma de México, JOSÉ J. LIZARDI, Universidad Autónoma de la Ciudad de México, FEDERICO MÉNDEZ, Universidad Nacional Autónoma de México — In this work, we use asymptotic and numerical techniques to analyze the conjugate heat transfer between a rarified gas flow and the lower wall of a thin horizontal microchannel exposed to a uniform heat flux, when the laminar motion of the gas is only caused by the thermal creep or transpiration effect on the lower wall of the microchannel. Usually, it is enough to impose a linear temperature profile as a boundary condition to produce the thermal creep effect. However, we prefer to avoid this arbitrary simplification taking into account that for real cases, the temperature profile at the lower wall can be unknown. We can assume then that the lower face of this heat sink with finite thermal conductivity and thickness is exposed to a uniform heat flux, while the upper wall of the microchannel is subject to a well-known prescribed thermal boundary condition. The resulting governing equations 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. Thermal creep effect depends strongly on a dimensionless conjugate parameter that represents the competition between the heat driven by the gas and the heat that longitudinally conducts the lower wall.

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