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Non-isothermal electro-osmotic flow in a microchannel with charge-modulated surfaces[1] OSCAR BAUTISTA, Instituto Politecnico Nacional, SALVADOR SANCHEZ, FEDERICO MENDEZ, Universidad Nacional Autonoma de Mexico — In this work, we present an theoretical analysis of a non-isothermal electro-osmotic flow of a Newtonian fluid over charge-modulated surfaces in a microchannel. Here, the heating in the microchannel is due to the Joule effect caused by the imposition of an external electric field. The study is conducted through the use of perturbation techniques and is validated by means of numerical simulations. We consider that both, viscosity and electrical conductivity of the fluid are temperature-dependent; therefore, in order to determine the heat transfer process and the corresponding effects on the flow field, the governing equations of continuity, momentum, energy and electric potential have to be solved in a coupled manner. The principal obtained results evidence that the flow patterns are perturbed in a noticeable manner in comparison with the isothermal case. Our results may be used for increasing microfluidics mixing by conjugating thermal effects with the use of charge-modulated surfaces.

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