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A CSCM approximation of steady MHD flow and heat transfer between parallel plates with hydrodynamic slip and convective boundary conditions. (English) [Zbl 07400964]


Summary: The steady magnetohydrodynamic (MHD) flow and heat transfer between parallel plates is considered in which the electrically conducting fluid has temperature dependent properties such as viscosity, thermal and electrical conductivity. The fluid is driven by a constant pressure gradient, and a uniform external transverse magnetic field is applied perpendicular to the plates. The effects of viscous and Joule dissipations are considered in the energy equation, and the fluid is assumed to be slipping in the vicinity of the plates. The effects of the magnetic field, the hydrodynamic slip, and convective thermal boundary conditions on the flow and heat transfer are investigated as well as the temperature dependent parameters. The Chebyshev spectral collocation method which is easy to implement is presented for the approximation of the solutions to the governing equations. The velocity and the temperature of the fluid are obtained with a cheap computational expense.

For the entire collection see [Zbl 1471.65009].

MSC:
65Z05 Applications to the sciences
00A69 General applied mathematics

Full Text: DOI

References: