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Numerical Study of Unsteady MHD Flow and Entropy Generation in a Rotating Permeable Channel with Slip and Hall Effects
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Abstract
This article investigates an unbiased analysis for the unsteady two-dimensional laminar flow of an incompressible, electrically and thermally conducting fluid across the space separated by two infinite rotating permeable walls. The influence of entropy generation, Hall and slip effects are considered within the flow analysis. The problem is modeled based on valid physical arguments and the unsteady system of dimensionless PDEs (partial differential equations) are solved with the help of Finite Difference Scheme. In the presence of pertinent parameters, the precise movement of the flow in terms of velocity, temperature, entropy generation rate, and Bejan numbers are presented graphically, which are parabolic in nature. Streamline profiles are also presented, which exemplify the accurate movement of the flow. The current study is one of the infrequent contributions to the existing literature as previous studies have not attempted to solve the system of high order non-linear PDEs for the unsteady flow with entropy generation and Hall effects in a permeable rotating channel. It is expected that the current analysis would provide a platform for solving the system of nonlinear PDEs of the other unexplored models that are associated to the two-dimensional unsteady flow in a rotating channel. © 2018 Chinese Physical Society and IOP Publishing Ltd.

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