SABER HAMIMID, UMBB, avenue de l'Indépendance, 35000 Boumerdes, Algérie
Numerical simulation of electrically conducting liquid flows in an external magnetic field

The present study is devoted to the problem of onset of oscillatory instability in convective flow of an electrically conducting fluid under an externally imposed time-independent uniform magnetic field. Convection of a low-Prandtl-number fluid in a laterally heated two-dimensional horizontal cavity is considered. Fixed values of the aspect ratio (height/width$= 1$) and Prandtl number ($\mathrm{Pr} = 0.015$), which are associated with the horizontal Bridgman crystal growth process and are commonly used for benchmarking purposes, are considered. The effect of a uniform magnetic field with different magnitudes and orientations on the stability of the two distinct branches (with a single-cell or a two-cell pattern) of the steady state flows is investigated. The combined effects of the magnetic field and the surface tension are presented graphically in terms of isotherm and streamline plots. The effects of varying the physical parameters on the rate of heat transfer from the heated surface of the enclosure are also depicted.