

On Joule heating triggered by oscillating surface

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Abstract

This study aims at investigating the amount of Joule heating which occurs as a result of oscillating surface in an electrically conducting fluid exposed to a uniform magnetic field. Joule heating increases the thermal boundary layer of the fluid and this affects heat transfer within the fluid and also the rate at which heat is transferred from the surface into the fluid. It is against this background that there is a need to investigate whether the Joule heating which is triggered by the oscillation of a surface is significant enough to a point of increasing the thickness of the boundary layer remarkably. Further, we shall investigate the parameters which can be controlled in order to minimize Joule heating. To achieve our objective we shall develop a suitable mathematical model.