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Numerical Investigation of Electrohydrodynamics: Enhanced Heat Transfer in a Solid Sample

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Abstract : This paper presents a numerical investigation of electrically driven flow for enhancing convective heat transfer in a channel flow. This study focuses on the electrode arrangements, number of electrode and electrical voltage on Electrohydrodynamics (EHD) and effect of airflow driven on solid sample surface. The inlet airflow and inlet temperature are 0.35 m/s and 60 ^oC, respectively. High electrical voltage is tested in the range of 0-30 kV and number of electrode is tested in the range of 1-5. The numerical results show that electric field intensity is depended on electrical voltage and number of electrode. Increasing number of electrodes is increased shear flow, so swirling flow is increased. The swirling flows from aligned and staggered arrangements are affecting within the solid sample. When electrical voltage is increased, temperature distribution and convective heat transfer on the solid sample are significantly increased due to the electric force much stronger.

Keywords : electrohydrodynamics (EHD), swirling flow, convective heat transfer, solid sample
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