

# **Numerical Study of EHD-Induced Flow Field in an Enclosed Rectangular Channel**

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## **Abstract:**

It has been known that the electrohydrodynamically (EHD) induced secondary flow, also known as corona wind, can significantly enhance heat and mass transfer. This enhancement can be improved by optimal design and arrangement of electrodes. It has been shown that the best heat transfer enhancement can be obtained when the electrodes are aligned with the primary flow so that the produced corona wind can further assist the transfer process. The current study investigates a three-dimensional enclosed rectangular channel with electrodes aligned and mounted on the four side walls. The electrical field was first calculated by solving the reduced Maxwell equation and current continuity equation, and which have been verified by experimental data. Then the flow and temperature fields are obtained by solving the Navier-Stokes equations and energy equation simultaneously. The flow field and temperature distributions will be presented for a wide range of the governing parameters. The enhancement in heat and mass transfer will also be evaluated and presented as well