

# Performance of Electrohydrodynamic Gas Pump in a Square Channel

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*Abstract*—The generation of a fluid flow within a square channel by electrohydrodynamic (EHD) gas pump are examined using numerical methods to seek the relation between the pump performance and number of emitting electrodes. EHD-induced flow in a square channel is investigated by developing a numerical model based on the collected experimental results. The 3D governing equations for the electric and flow fields are solved using the finite difference and finite volume method respectively. The results are compared with the collected experimental data to validate the computational code. This study has been performed for the EHD gas pump with three emitting electrode configurations: 4, 12, and 28 emitting electrodes respectively for a wide range of operating voltages starting from the corona threshold voltage up to 24 kV. In this study, EHD gas pump with 4 emitting electrodes produce air flows with a maximum velocity of 7.5! m/s. The maximum performance of 17 L/s/W is achieved by using 4 emitting electrodes is better than most of the conventional cooling fans used in personal computers.