

# Electrical Characteristics of Electrohydrodynamic Gas Pump in a Square Channel

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*Abstract*—The impact of high applied voltages on the electrical characteristics of electrohydrodynamic (EHD) gas pump in a square channel is investigated by numerical analysis. This study has been performed for the EHD gas pump with three emitting electrode configurations of conductor: 4, 12, and 28 respectively for a wide range of operating voltages starting from the corona threshold voltage up to 30 kV. Also, each conductor is tested for 0.5-inch, 1.0-inch and 2.0-inch wide grounded electrode. The simulations are validated with adaptive meshing feature, which actually eliminate the necessity of creating custom meshing. The converged numerical results for electric field intensity, charge, voltage, and energy distribution is validated by the error criteria. The percentage of ionized air is increased, if the size of grounded electrode is increased for the same number of emitting electrodes, and vice versa. Also, the electric field intensity is increased by the increment of conductor emitting electrode number and size of grounded electrode. Forces are increased when applied voltage increased despite their direction. The results of the numerical study showed that the use of different number of conductor electrode and change in ground electrode size have a great impact on the EHD electrical characteristics with a significant deviation of forces on ground electrode, conductor, and test region.