OPTIMISATION OF GAS EHD PUMP WITH A NOZZLE DOWNSTREAM

Rakesh Prasad\textsuperscript{a} and Dr. T. M. Muruganandam\textsuperscript{b}

\textsuperscript{a}Post-Graduate Student, Dept. Of Aerospace Engineering
\textsuperscript{b}Asst. Professor, Dept. Of Aerospace Engineering, IIT Madras, Chennai, India

The high voltage applied between the electrodes ionizes air near emitting electrode. The ions formed drift towards collecting electrode due to the electric field resulting in Ionic wind. A needle and cone configuration is used to induce velocity in EHD gas pump. This paper investigates effectiveness of the collecting electrode to induce ionic wind and to use corona discharge as driving mechanism for a gas pump.

In the experimental set up (shown in figure 1), a high Voltage DC supply is used for applying a high voltage between the electrodes. The needle is used as corona electrode and collecting electrode is made of thin aluminum sheet. The electrodes are held inside the EHD gas pump with acrylic holders (a good insulator). Velocity is measured using a Pitot tube along with a micro manometer.

Figure 1: Ehd pump without and with nozzle

Experiments with regular conical configurations as collecting electrode (figure 1) for ehd pumps with and without nozzle shows variation of average velocity with gap& its dependency on configuration and orientation of electrode (a new non dimensional parameter called Electrode Geometry Factor (EGF) is introduced). Average velocity behaves inversely with the newly proposed parameter, EGF. It was observed that the maximum thrust obtained was lower in a EHD pump without nozzle as compared to one with nozzle The optimum gap (at which the maximum thrust is obtained) is different for both cases.


Rakesh Prasad.: e-mail: rakeshprasad99@gmail.com,
Telephone: +91-9789908178
Dr.T.M.Muruganandam.: Corresponding author e-mail: murgi@ae.iitm.ac.in, Telephone: +91-44-2257 4022