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Enhancement of electric force on ions by ion - neutral collisions¹ GENNADY MAKRINICH, AMNON FRUCHTMAN, H.I.T. - Holon Institute of Technology — The force exerted by a radially-outward plasma and neutral flow from a Radial Plasma Source (RPS) [1], is measured. From the measured force, the electric force exerted on the ion flow by the applied electric field is deduced. This force is found to be larger than the electric force that can be exerted if the ions are collisionless. In addition, the increase of the gas pressure is found to result in an increase of the electric force despite a simultaneous decrease of the deposited electric power. Employing a simple model, we argue that these experimental findings result from the electric force being felt by the ions for a longer time; their residence time in the acceleration region is increased due to their slowing-down collisions with neutrals. In separate experiments, when no magnetic field is present, a plasma ball is formed, attached to the anode. We measure the force exerted by the plasma and neutrals flowing away from the ball. We relate the measured force to the estimated density and temperature of the plasma of the plasma ball.

[1] G. Makrinich and A. Fruchtman, Phys. Plasmas 16, 043507 (2009).

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