ON MAGNETIC FIELD GEOMETRY AND ITS EFFECTS ON DOUBLE LAYERS AND FLOWS IN LOW-TEMPERATURE PLASMAS

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Abstract. The Njord device is an inductively coupled plasma device with 13.56 Mhz and 400-900 W RF power inserted into the working gas by means of a saddle antenna through a 13.8 cm ID pyrex tube. The source plasma expands through a 10 cm long port into a 0.6m diameter and 1.2m long chamber. Two magnetic field coils around the source and one additional downstream coil produce a magnetic field of about 25 mTesla maximum. Double layers have been found to form in argon discharge under low-pressure conditions and expanding field, and it is generated through a sharp potential drop of up to ~25V at the position where the plasma expands into the main chamber. By means of a downstream field coil, we have investigated the plasma confinement, beam formation and flow as the magnetic field is shaped from a purely expanding field to a mirror configuration. The downstream plasma density and plasma potential increase significantly as the magnetic field lines are straightened and become parallel. As the plasma potential is becoming comparable to the source potential the beam disappears and is replaced by a subsonic flow. In this talk, we will review the details of the plasma parameters, focusing on plasma flow and energy distributions, in response to the variation of the downstream magnetic field geometry.