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2D RF ICP Torch Modelling with Fluid Plasma

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Abstract : A numerical model for the radio-frequency (RF) Argon discharge chamber is developed to simulate the low pressure low temperature inductively coupled plasma. This model will be of fundamental importance in the design of the plasma magnetic control system. Electric and magnetic fields inside the discharge chamber are evaluated by solving a magnetic vector potential equation. To start with, the equations of the ideal magnetohydrodynamics theory will be presented describing the basic behaviour of magnetically confined plasma and equations are discretized with finite element method in cylindrical coordinates. The discharge chamber is assumed to be axially symmetric and the plasma is treated as a compressible gas. Plasma generation due to ionization is added to the continuity equation. Magnetic vector potential equation is solved for the electromagnetic fields. A strong dependence of the plasma properties on the discharge conditions and the gas temperature is obtained.

Keywords : direct-coupled model, magnetohydrodynamic, modelling, plasma torch simulation
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