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Simulation of reactive and resistive resonances of a curling probe for low and high pressure plasma diagnostics ALI ARSHADI, RALF PETER BRINKMANN, Ruhr University Bochum — Curling probe (CP) as a novel realization of "Active Plasma Resonance Spectroscopy" concept, reveals a great ability for electron density measurement in a low pressure plasma. A weak RF signal is coupled into the plasma via a CP. The spectral response of the plasma is recorded and a mathematical model is used to determine the electron density. The CP is a spiral slot resonating at distinctive frequencies which are strongly dependent on the electron density. Since the CP can be miniaturized and flatly embedded into the chamber wall, the perturbation and metal contamination are negligible. With the assumption of little spiralization effect, this work investigates a "straightened" CP. The diffraction of an incident plane wave at a rectangular slot is calculated by solving Maxwell's equations and the cold plasma model simultaneously. In low pressure plasmas two kinds of reactive resonance are observed. The lower frequency of resonance has a surface wave characteristic and the higher one is associated with the wave propagation along the probe length. In high pressure plasmas reactive resonance is not observed but a resistive reonance even at frequencies smaller than the surface wave frequency is excited. Good agreement of our computations with the numerical results is shown.

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