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Abstract Submitted
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Analysis of Kinetic Dynamics of the Multipole Resonance Probe

JUNBO GONG, Ruhr University Bochum, MICHAEL FRIEDRICHS, Leuphana University Lneburg, SEBASTIAN WILCZEK, DENIS EREMIN, Ruhr University Bochum, JENS OBERRATH, Leuphana University Lneburg, RALF PETER BRINKMANN, Ruhr University Bochum — Active Plasma Resonance Spectroscopy (APRS) denotes a class of industry-compatible plasma diagnostic methods. One particular realization of APRS with a high degree of geometric and electric symmetry is the Multipole Resonance Probe (MRP). The Ideal MRP is an even more symmetric idealization which is suited for theoretical investigations. In this work, a spectral kinetic scheme is presented to investigate the behavior of the Ideal MRP in the low pressure regime. Similar to the particle-in-cell method, the scheme consists of two modules, the particle pusher and the field solver. A Green's function is defined to solve this potential problem. The spherical harmonics is employed to provide a general solution. With suitable truncation of the harmonics expansion, the complexity of the task can be reduced. The proposed kinetic model overcomes limitation of the cold plasma model and covers kinetic effects. Numerical results illustrate the resonance behavior and damping phenomena due to the escape of particles.

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