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Spectral Kinetic Simulation of the Ideal Multipole Resonance Probe JUNBO GONG, SEBASTIAN WILCZEK, DANIEL SZEREMLEY, Ruhr-University Bochum, Germany, JENS OBERRATH, Leuphana University Lüneburg, Germany, DENIS EREMIN, Ruhr-University Bochum, Germany, WLADISLAW DOBRYGIN, Robert Bosch GmbH, Germany, CHRISTIAN SCHILLING, MICHAEL FRIEDRICHS, RALF PETER BRINKMANN, Ruhr-University Bochum, Germany — The term Active Plasma Resonance Spectroscopy (APRS) denotes a class of diagnostic techniques which utilize the natural ability of plasmas to resonate on or near the electron plasma frequency ω_{pe}: An RF signal in the GHz range is coupled into the plasma via an electric probe; the spectral response of the plasma is recorded, and a mathematical model is used to determine plasma parameters such as the electron density ne or the electron temperature Te. One particular realization of the method is the Multipole Resonance Probe (MRP). The ideal MRP is a geometrically simplified version of that probe; it consists of two dielectrically shielded, hemispherical electrodes to which the RF signal is applied. A particle-based numerical algorithm is described which enables a kinetic simulation of the interaction of the probe with the plasma. Similar to the well-known particle-in-cell (PIC), it contains of two modules, a particle pusher and a field solver. The Poisson solver determines, with the help of a truncated expansion into spherical harmonics, the new electric field at each particle position directly without invoking a numerical grid. The effort of the scheme scales linearly with the ensemble size N.

Sebastian Wilczek
Ruhr-University Bochum

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