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A spectral Poisson solver for kinetic plasma simulation DANIEL SZEREMLEY, Institute for Theoretical Electrical Engineering, Ruhr University Bochum, JENS OBBERATH, RALF PETER BRINKMANN — Plasma resonance spectroscopy is a well established plasma diagnostic method, realized in several designs. One of these designs is the multipole resonance probe (MRP) [1]. In its idealized – geometrically simplified – version it consists of two dielectrically shielded, hemispherical electrodes to which an RF signal is applied. A numerical tool is under development which is capable of simulating the dynamics of the plasma surrounding the MRP in electrostatic approximation. In this contribution we concentrate on the specialized Poisson solver for that tool. The plasma is represented by an ensemble of point charges. By expanding both the charge density and the potential into spherical harmonics, a largely analytical solution of the Poisson problem can be employed. For a practical implementation, the expansion must be appropriately truncated. With this spectral solver we are able to efficiently solve the Poisson equation in a kinetic plasma simulation without the need of introducing a spatial discretization.

[1] M. Lapke et al., Appl. Phys. Lett. **93**, 051502 (2008)

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