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A Functional Analytic Description of the Multipole Resonance Probe¹ JENS OBERRATH, MARTIN LAPKE, THOMAS MUSSENBROCK, RALF PETER BRINKMANN, Theoretical Electrical Engineering, Ruhr University Bochum — The plasma resonance spectroscopy is a well established plasma diagnostic method and realized in several designs. Based on Hilbert-space methods it is possible to derive a general mathematical solution for arbitrary diagnostic designs. An analysis shows the main feature of this family of methods, it is the ability of the system to resonate. An interpretation in terms of a lumped element circuit reveals the main weakness of certain realizations. A complicated resonance structure that impedes a clear and simple analysis of the measured spectrum is observed. The multipole resonance probe (MRP) is presented as an idea to overcome this problem in terms of a high geometrical and electrical symmetry [1]. To determine its resonance structure an analytic expression for the probe response is needed. We derive a solution to this special diagnostic design based on the functional analytic description.

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

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