Stability results for a delta-delta discretization of volume integral equations

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July 29, 2022

A very popular numerical method for the dielectric scattering problem of electromagnetic waves is the Discrete Dipole Approximation (DDA). This is a discretization method for strongly singular volume integral equations that is very simple to implement, fast and apparently reliable. It does, however, not fit in the known framework of projection methods. Thus there is no published proof of the stability (and hence, convergence) of this method. On the way to such a stability proof, recently some partial results have been obtained, using Fourier analysis of Toeplitz matrices, that show that the question is non-trivial. The talk will focus on analytical and numerical results in 1 and 2 dimensions.

Acknowledgment: Work done in the framework of a joint project with Eric Darrigrand (Rennes), Monique Dauge (Rennes) and Khadijeh Nedaiasl (Zanjian, Iran).