On Numerical Solution of Boundary Integral Equations with Singular Kernels

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Many problems in electromagnetism can be reduced to the solution of boundary integral equations whose kernels have weak or strong singularities. It is very desirable to develop approximate techniques for numerical solution of such integral equations which are insensitive to the singular nature of integral equation kernels and are applicable to any (reasonable) geometry of the boundary *S* on which the integral equations are defined.

On such numerical technique will be discussed in my talk. It will be demonstrated that unique solvability of discretized equations for any mesh and any geometry of *S*, convergence and the optimal rate of convergence of this numerical technique can be established under only one natural condition of unique solvability of integral equations. According to the Banach theorem, the last condition implies the existence of bounded inverse operators for the integral equations being solved.

The application of this numerical technique for the calculation of the extinction cross section of nanoparticles in plasmonics will be discussed as well.