

Efficient and Accurate Discretization of Singular Integral Operators on Surfaces

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The integral equation formulations of elliptic boundary value problems given on three dimensional domains involve singular integral operators defined on surfaces. The discretization of such operators is widely regarded as a technically challenging and time-consuming task. We will describe a simple-minded, fast and highly accurate algorithm for the discretization of a large class of singular integral operators given on surfaces. Although our algorithm can be applied to triangulated surfaces, it can take advantage of any additional smoothness in the description of the surface in order to achieve higher order convergence. We will discuss the use of our algorithm in the solution of certain scattering problems given on surfaces with complicated geometry.