Carlos Jerez

Departamento de Ingeniería Matemática
Pontificia Universidad Católica de Chile

Optimal Preconditioning for the Hypersingular Operators on Screens

Abstract:

We propose a new Calderón–type preconditioner for the hypersingular integral operator for the Laplacian on screens in $\mathbb{R}^3$. We introduce a modified weakly singular operator, which is the exact inverse of the hypersingular operator on the unit disk. It forms the foundation for dual–mesh based operator preconditioning. Applied to low–order boundary element Galerkin discretizations, it achieves h-uniformly bounded condition numbers. Heuristic extensions to general screens even with non-smooth boundaries are discussed. Their good performance is confirmed by numerical tests.