



THE UNIVERSITY OF
CHICAGO

COMPUTATIONAL AND APPLIED MATHEMATICS COLLOQUIUM

BOBBIE WU

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University of Texas at Austin

A Simple Quadrature for Fast Integral Equation Solvers

THURSDAY, May 13, 2021 at 4:15pm (Central)

Via ZOOM

The boundary integral equation method (BIE) is efficient and robust for solving boundary value problems for elliptic PDEs, such as Laplace, Helmholtz, Stokes, and Maxwell equations. Advantages of the BIE method include the unknowns residing only on the boundary of the domain, automatic satisfaction of conditions at infinity, well-conditioned linear system upon discretization, and availability of fast algorithms that enable linear (or almost linear) solution time.

One key ingredient of an efficient BIE solver is a high-order surface quadrature for the underlying singular kernel. Developing such quadratures has been a challenge especially for 3D problems. In this talk, we introduce a simple quadrature method based on a remarkable connection between the trapezoidal rule and zeta functions. The quadrature is high-order accurate for a family of singular integrals on contours and surfaces, and can be easily combined with state-of-the-art fast algorithms.

Organizer:

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