QUADRATURE ERROR ESTIMATES FOR KERNELS WITH LOGARITHMIC SINGULARITY

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In this work, we present accurate error estimates for two commonly used quadrature rules—the Gauss-Legendre and trapezoidal rules—when applied to the numerical evaluation of two-dimensional layer potentials with logarithmic singularities. Accurately estimating quadrature error is crucial in boundary integral methods, especially as the evaluation point nears the boundary of the domain. In such cases, the integrals become nearly singular, and the standard quadrature error can grow rapidly. Our results provide a way to quantify this error growth, helping practitioners to recognize when standard methods no longer provide sufficient accuracy and specialized quadrature techniques are necessary. These estimates represent the fundamental key to build novel efficient numerical solvers for boundary integral equations.