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*Fast multipole methods for continuous charge distributions*

Applications with continuous charge distributions or continuously varying material properties require the calculation of so-called volume integrals involving the Green's function of the governing PDE. These integrals can be both singular and nearly singular and thus require special quadrature. We present a method for generating such quadrature rules that is efficient enough to be done on-the-fly. We also discuss how these quadrature rules are incorporated in a fast multipole method and demonstrate some applications of the scheme to optical scattering problems.