

Effective Condition Number and its Applications to Boundary Integral Equations and Partial Differential Equations

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Abstract

In this talk, we first introduce the basic ideas of effective condition number Cond_eff , and then apply it to the advanced (i.e., mechanical) quadrature methods (AQMs) for solving the boundary integral equations (BIEs) of the first kind. Both the condition number (Cond) and the effective condition number (Cond_eff) for the discrete matrix are derived to be the same order $O(h_{\min}^{-1})$, which are supported by numerical results. This behavior of Cond_eff is greatly distinct to that for numerical partial differential equations (PDEs), where Cond_eff is much smaller than Cond . The other aim of this talk is to explore intrinsic characteristics of Cond_eff , and to make a comparison with numerical PDEs.

Keyword. Stability analysis, condition number, effective condition number, first kind boundary integral equation, advanced (i.e., mechanical) quadrature method, numerical partial differential equations.