

A comparison of nearly singular integrals evaluation method for isogeometric boundary element method (IGABEM)

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IGABEM has received much attention and achieved rapid development in recent years, motivated by its advantages of exact representation of geometry, high accuracy, reducing the dimensionality of the problem by one, and others. In IGABEM, the accurate and efficient quadrature routines for varying degrees of singular integrals play a crucial aspect of numerical implementation. However, nearly singular integrals may arise, especially in thin-body structures and coatings. These near singularities need to be treated carefully to ensure accuracy of the final solutions.

In this work we compare different methods for evaluating nearly singular integrals arising from weak and strong singularities in IGABEM. Methods evaluated include the adaptive method [1], *sinh* method [2], exponential transformation method [3], *sinh* transformation method [4], as well as more established coordinate transformations. We propose a new accurate and efficient scheme to optimise the choice of the method based on the aspect-ratio of the element and the closest distance to the source point. Furthermore, a structure with a coating is considered in order to quantify the effect of the nearly singular integrals in the numerical method.

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