

Corner and crack singularity of different boundary conditions for linear elastostatics and their numerical solutions

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Abstract

This paper is devoted to study an important subject that the displacement and the free traction boundary conditions are assigned on the different edges of corners. Such different boundary conditions can often be found in engineering applications. Techniques for handling linear elastostatics with different boundary conditions are more intriguing and advanced, because the particular solutions are involved in $O(r^{\nu k})$ with complex power νk , and because the complex coefficients are also needed. Two new model problems of corner singularity are designed for $\theta=2\pi$ and $\theta=\pi$, their highly accurate solutions and intensity factors can be achieved by the collocation Trefftz method. An advanced and comprehensive analysis of corner singularity of linear elastostatics of different boundary conditions is established in this paper, and the singular solutions can be used in numerical computation, thus to greatly enhance the Trefftz method, including the collocation Trefftz method, the hybrid Trefftz method, the combined method, etc.

Keyword : Particular solutions, Singular solutions, Different boundary conditions, Linear elastostatics, Corner singularity, Trefftz method, Collocation Trefftz method, Hybrid Trefftz method