Summary: We consider the elastic stress near a hole with corners in an infinite plate under biaxial stress. The elasticity problem is formulated using complex Goursat functions, resulting in a set of singular integro-differential equations on the boundary. The resulting boundary integral equations are solved numerically using a Chebyshev collocation method which is augmented by a fractional power term, derived by asymptotic analysis of the corner region, to resolve stress singularities at corners of the hole. We apply our numerical method to the test case of the hole formed by two partially overlapping circles, which can include either a corner pointing into the solid or a corner pointing out of the solid. Our numerical results recover the exact stress on the boundary to within relative error $10^{-3}$ for modest computational effort.

MSC:
65-XX Numerical analysis  
74-XX Mechanics of deformable solids

Keywords:
boundary integral equations; corners; elasticity; Goursat functions; numerical methods; stress singularities

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