Numerical solution for elliptical crack with developing cusps subject to shear loading.

ABSTRACT

This paper study the behavior of the solution at the crack edges for an elliptical crack with developing cusps, Ω in the plane elasticity subjected to shear loading. The problem of finding the resulting shear stress can be formulated as a hypersingular integral equation over Ω and it is then transformed into a similar equation over a circular region, D, using conformal mapping. An appropriate collocation points are chosen on the region D to reduce the hypersingular integral equation into a system of linear equations with $(2N+1)(N+1)$ unknown coefficients, which will later be used in the determination of shear stress intensity factors and maximum shear stress intensity. Numerical solution for the considered problem are compared with the existing asymptotic solution, and displayed graphically. Our results give a very good agreement to the existing asymptotic solutions.