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Upper and Lower Bounds of Electric Induction Intensity Factors for Multiple Piezoelectric Cracks by the BEM

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The coupling of mechanical and electrical behaviors of the piezoelectric materials has find its many applications. However, they are plagued with the brittleness of the widely used piezoceramic materials. The lack of understanding and modeling tools of the piezoelectric fracture is limiting the further progress in the piezoelectric material based technology. This paper addresses issues on the crack surface electric boundary conditions. and suggests the upper and lower bound approach in the determination of the electric induction intensity factors using the boundary element method. These bounds are obtained by the using the impermeable and permeable crack solutions. The numerical Green's function for the crack is developed by the analytical integration of the continuous distribution of the generalized dislocation dipoles. The Green's function has the generalized stress singularity and no post process for the intensity factor determination is needed.

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