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Effects of electric field and strain gradients on cracks in piezoelectric solids

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Highlights to review

The paper presents a general approach to analyse 2-D crack problems where the electric field and displacement gradients exhibit a size effect.

The variational principle is applied to derive governing equations for piezoelectric solids described by the electric field-strain gradient theory. The size-effect phenomenon in micro/nano electronic structures is described by the strain- and electric field-gradient effects.

The FEM formulation for the solution of crack boundary value problems is developed for the electric field-strain gradient piezoelectricity.

In the framework of this theory the path-independent *J*-integral is derived. The domain-form of the *J*-integral in strain- and electric field-gradient piezoelectricity is derived too.