

# Accepted Manuscript

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

Jan Sladek, Vladimir Sladek, Michael Wünsche, Chuanzeng Zhang

PII: S0997-7538(17)30447-3

DOI: [10.1016/j.euromechsol.2018.03.018](https://doi.org/10.1016/j.euromechsol.2018.03.018)

Reference: EJMSOL 3577

To appear in: *European Journal of Mechanics / A Solids*

Received Date: 6 June 2017

Revised Date: 18 March 2018

Accepted Date: 19 March 2018

Please cite this article as: Sladek, J., Sladek, V., Wünsche, M., Zhang, C., Effects of electric field and strain gradients on cracks in piezoelectric solids, *European Journal of Mechanics / A Solids* (2018), doi: 10.1016/j.euromechsol.2018.03.018.

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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.

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