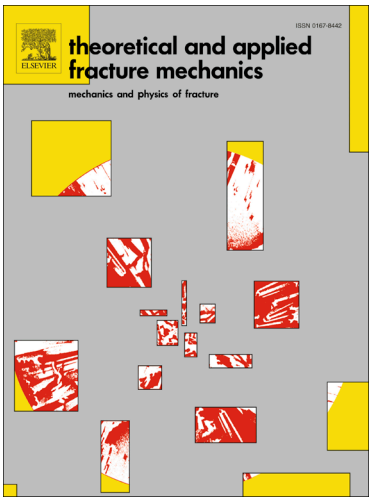

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The linear steady state analysis of multiple moving cracks in a piezoelectric half-plane under in-plane electro-elastic loading

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ABSTRACT

In this work, the steady state problem of multiple Yoffe-type cracks propagating in a piezoelectric half-plane within the framework of linear electroelasticity under in-plane electro-elastic loading is studied. At first, the closed-form solution of the moving electric and Volterra type climb and glide edge dislocations are derived using the complex Fourier transforms to achieve the integral equations of a piezoelectric half-plane with several moving cracks. Then, the integral equations with Cauchy-kind singularity are solved numerically to determine the mixed mode stress intensity factors and the electric displacement intensity factors in a piezoelectric medium. Finally, the effects of the loading conditions, crack moving speed, cracks lengths, cracks interactions and geometrical parameters on the field intensity factors are considered.

Keywords: Mixed mode loading**;** Piezoelectric half-plane; Several moving cracks; Climb and glide edge dislocations.

1. Introduction

With the intrinsic electro-mechanical coupling characteristics, piezoelectric materials have been widely used in smart systems as a new tool in designing materials for specific applications such as sensors and actuators. The study of the fracture analysis for piezoelectric materials provides beneficial information to improve the design of electromechanical devices and brings better understanding of the mechanisms of piezoelectric cracking. Due to the complexity of the analyzing

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