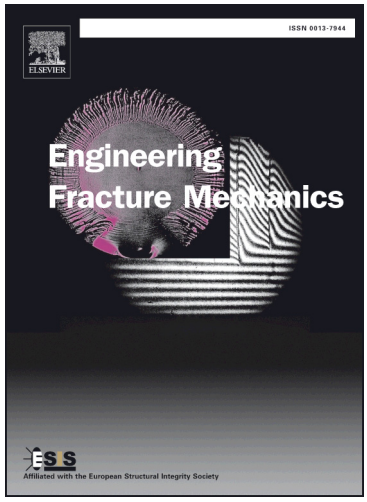

Non-local theory behavior of multiple cracks in a functionally graded piezoelectric medium

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Non-local theory behavior of multiple cracks in a functionally graded piezoelectric medium

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Abstract: In this paper, the non-local theory solution of multiple cracks in a functionally graded piezoelectric medium (FGPM) under the permeable electric boundary condition have been investigated. Overcoming the mathematical difficulty, a one-dimensional non-local kernel is used instead of a two-dimensional one for the fracture problem to obtain stress and electric displacement fields near the crack tips. By using Fourier transform techniques, the present problem was reduced to the solution of dual integral equations, which unknown variable is jumps of displacement across the crack surface. The present solution exhibits no stress and electric displacement singularities at the crack tips when non-local is used to investigate the problem. The non-local solution yields a finite hoop stress at the crack tips, thus allows us to use the calculated maximum stress as a fracture criterion.

Key words: multiple cracks; non-local theory; functionally graded piezoelectric medium; the lattice parameter

1. Introduction

In recent years, the functionally graded piezoelectric medium (FGPM) have been absorbed much attention with their increasing usage in various application and high temperature environments because of their gradually changed material properties. The fracture problems of FGPM have been considered in works [1-5]. For instance, Ueda [1] studied the transient response of a penny-shaped crack in a plate of a functionally graded piezoelectric material (FGPM) under thermal shock loading conditions. Rao and Kuna [3] presented domain form of the interaction integrals based on three

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