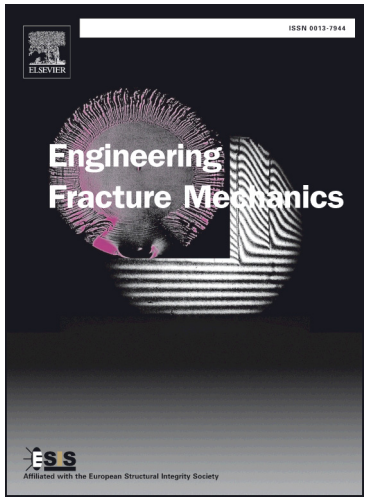

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Some features of the PPR cohesive-zone model combined with a linear unloading/reloading relationship

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Abstract

A loading/unloading/reloading process is applied to a cohesive zone where the model proposed by Park, Paulino and Roesler in 2009 is combined with a linear unloading/reloading relationship. The applied loading and unloading use the same mixed mode and reloading is in mode I. When the amplitude of preloading is varied, several features are evidenced: jumps of the dissipated energy, reversibility maintained after a traction peak, nonlinear traction variations during unloading, increasing traction during unloading, finite traction after a fracture criterion has been fulfilled, different traction values at the beginning of unloading and when dissipative reloading begins. Moreover, the results depend strongly on the path followed during unloading. Simple modifications of the model allow none of these questionable features to appear.

Keywords: Cohesive zone, PPR model, Loading/unloading relationship

1. Introduction

In 2009, Park, Paulino and Roesler [1] proposed a potential-based cohesive-zone model (CZM) that is very flexible and can cover a large scope of applications. This model has been cited in many papers since then, and programmes were made available to apply the Park-Paulino-Roesler (PPR) model in two-dimensional [2] or three-dimensional [3] finite element simulations. This is one of the noteworthy merits of the model, which should

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