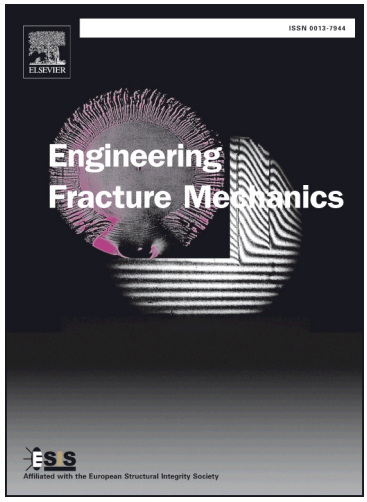

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PII: S0013-7944(16)30703-2
DOI: http://dx.doi.org/10.1016/j.engfracmech.2017.03.032
Reference: EFM 5457

To appear in: *Engineering Fracture Mechanics*

Received Date: 7 December 2016
Revised Date: 22 March 2017
Accepted Date: 23 March 2017

Please cite this article as: Zhang, J., Lu, Y., He, L., Yang, L., Ni, Y., Modeling progressive interfacial debonding of a mud-crack film on elastic substrates, *Engineering Fracture Mechanics* (2017), doi: http://dx.doi.org/10.1016/j.engfracmech.2017.03.032

Modeling progressive interfacial debonding of a mud-crack film on elastic substrates

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Abstract

When a tensile brittle film is moderately bonded to elastic substrates interface can debond and exhibit complex debonding morphology after formation of a mud-crack pattern. The experimentally observed debonding morphology significantly depends on the film thickness and the mud-crack pattern. In this paper we propose a continuum approach to simulate the evolution of complex debonding front in the mud-crack film. This approach combines the phase field microelasticity model for multiple mud-like crack problem and the cohesive interface model for tracking arbitrary interface debonding front. Using the simulation, how the mud-crack pattern and the anisotropic stress lead to anisotropic interface debonding are revealed. The film thickness dependent debonding morphology observed in experiment is recovered and the mechanism of its formation is discussed based on fracture mechanics.

Keywords: thin film, interface debonding, channel crack, phase field

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