Technical University of Denmark

DTU

A Mixed Cohesive Law Incorporating Interface Roughness Effects under (near) Pure Mode II Cracking

Sørensen, Bent F.; Goutianos, Stergios

Publication date:
2011

Link back to DTU Orbit

Citation (APA):
Sørensen, B. F., & Goutianos, S. (2011). A Mixed Cohesive Law Incorporating Interface Roughness Effects under (near) Pure Mode II Cracking. Abstract from 11th International Conference on the Mechanical Behavior of Material, Lake Como (IT), 5-9 Jun, .

DTU Library
Technical Information Center of Denmark

A Mixed Cohesive Law Incorporating Interface Roughness Effects under (near) Pure Mode II Cracking

B. F. Sørensen and S. Goutianos
Materials Research Division, Risø National Laboratory for Sustainable Energy
Technical University of Denmark, Frederiksborgvej 399, P.O. Box 49
4000 Roskilde, Denmark

bsqr@risoe.dtu.dk

ABSTRACT

Experimental investigations of adhesive joints and fibre composites have shown that under pure or near Mode II cracking, the fracture process zone induces a displacement normal to the cracking plane. This effect can be attributed to the roughness of the fracture surface under dominating tangential crack face displacements. As the crack faces displace relatively to each other (contact zone), the roughness asperities ride on top of each other and result in an opening (dilatation) in the normal direction. Furthermore, the interaction of the crack surfaces in the contact zone gives rise to compressive normal stresses and frictional shear stresses opposing the crack face displacements. A mixed mode cohesive zone law, derived from a potential function, is developed to describe the above mentioned fracture behaviour under monotonic opening. The cohesive law is implemented in the commercial finite element program Abaqus. The model is validated against experimental results under various mode mixities.