SM9L_11484

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

On Crack Assessment at Bimaterial Interfaces

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Wedge type situations create stress concentrations which may lead to crack initiation. Based on the knowledge of the singular fields, the direction of crack nucleation can be detected using the novel Boundary Finite Element Method which requires significantly less discretization effort compared to the well established Finite Element Method. The investigations presented here concentrate on a plane model of a bimaterial wedge which is set under arbitrary loading, simulating various mixed mode situations. An essential question is to find a criterion for the assessment of crack nucleation. For that aim, the hypothesis of Leguillon is adapted for thin layers on a substrate and calculated for sealing joints of high temperature fuel cells. The crack is assumed to be critical when and only when both the released energy and the local stress reach critical values along a hypothetical crack of finite length.

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