

one crack, Static analysis, eigenvalue analysis, Timoshenko beam, macro element

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چکیده :

Delamination of elastic thin films from their substrate under thermal or lattice mismatch strain is a classical problem in fracture mechanics. In this paper, we consider this problem where a nanoscale thin film is subject to a combined lattice mismatch strain and a chemical strain induced by solute insertion. The chemical loading differs from its classical counterpart in that the solute-induced strain itself depends on stress distribution in the film, giving rise to a fully-coupled chemo-elasticity problem. In this paper, we adopt a linearized chemo-mechanical model to study the stress intensity factors at the edge of an elastic nano-film on an elastic thick substrate. Within membrane approximation, the problem is reduced to finding solute concentration and stress in a semi-infinite membrane adhered to a substrate. The governing equation is a singular integral equation which is solved semianalytically. The effect of chemo-mechanical coupling on the stress intensity factors is presented

کلید واژه : chemical loading, nano-film, solute insertion, stress intensity factor, delamination

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