

On the mixed mode growth of brittle and interface cracks

A. Salvadori¹, P.A. Wawrzynek², A.R. Ingraffea², A.Carini¹

¹ DICATA, University of Brescia, Italy

² Cornell Fracture Group, Rhodes Hall, Ithaca, NY 14850, USA

alberto.salvadori@ing.unibs.it

ABSTRACT

In the presence of mixed mode loading, the elongation of an interface crack results in a competition among the relative toughnesses of the surrounding layers and of the interface itself. It is shown that: i) In homogeneous materials, the K-dominant region of small strain elasticity about the crack tip seems to favour an evolution into brittle cracks of defects at an angle far away from the principal stress direction; ii) When the crack propagates straight along an interface in layered materials, the load at the onset of propagation is higher than the one required to elongate the crack into a surrounding homogeneous isotropic domain. Therefore a collinear elongation in mixed mode conditions requires a higher amount of energy, which changes with the mode mixity. This is in agreement with experimental evidence and previous modelling.