

A domain-independent integral for fracture of piezoelectric composites

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Piezoelectric composites are widely used in modern technical areas serving as sensors, actuators or transducers due to their intrinsic electro-mechanical effect. Piezoelectric components are usually integrated into complex smart structures or embedded as fibers into multifunctional composites, which leads to that most of piezoelectric composites contain complex electro-mechanical interfaces. Unfortunately, it is a great difficulty to solve the fracture parameters in complex-interface environments by using present fracture mechanics techniques. Here, a domain-independent integral is introduced for solving the fracture parameters of piezoelectric composites. The present integral is domain-independent for material nonhomogeneity and discontinuity. Namely, the integral does not require the piezoelectric media to be differentiable and continuous and thus, it may become one of the most promising techniques for fracture analysis of piezoelectric composites with complex interfaces.

Keywords: Piezoelectric composites, fracture, domain-independent integral, interfaces