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Characterizing fracture performance and the interaction of propagating cracks with locally weakened interfaces in adhesive joints

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Abstract

This paper experimentally investigates adhesive fracture resistance and crack path selection in adhesive joints containing well-defined localized interfacial defects. Several systematic patterns of localized interfacial defects were created on base-acid treated aluminum adherends by physical vapor deposition of copper through a mask. Adhesive joints were prepared using a commercially available structural epoxy adhesive and the effect of localized interface defects on the performance of adhesive joints was studied. Under mode-I loading conditions, the presence of localized weak interfaces influenced the fracture energy of a propagating debond over a considerable distance. For a crack tip approaching a given weak interface pattern, a falling or reverse R-curve type trend was observed. Within the same DCB specimen, as the crack tip advanced beyond the patterned region, a rising R-curve type trend was observed as fracture

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