

RESUMO N° 418

ANALYSIS OF COMPOSITE STRUCTURES USING FINITE FRACTURE MECHANICS

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A new model based on finite fracture mechanics is proposed to predict the strength of composite laminates in the presence of stress concentrations. Failure and the associated crack extension at the onset of instability are predicted when both stress-based and energy-based criteria are simultaneously satisfied. The material properties required by the model are the ply elastic properties, and the laminate unnotched strength and fracture toughness, which may depend on the crack extension. Using experimental data obtained in quasi-isotropic carbon-epoxy laminates it is concluded that the model predictions are very accurate, resulting in improvements over the traditional strength prediction methods. It also is shown that the proposed finite fracture mechanics model can be used to predict the brittleness of different combinations of materials and geometries.