Application of the point stress criterion to the failure of composite pinned joints

H.A. Whitworth · O. Aluko, N.A. Tomlinson
Department of Mechanical Engineering, College of Engineering, Architecture and Computer Sciences, Howard University, 2300 Sixth Street, NW, Washington, DC 20059, United States
Received 29 July 2006; received in revised form 2 December 2006; accepted 4 December 2006
Available online 25 January 2007

An analysis was performed to evaluate the bearing strength of pin-loaded composite joints using a two parameter characteristic curve model. This model involves determination of characteristic dimensions in tension and compression and based on this model, a two-dimensional stress analysis was used to determine the stress distribution around the fastener hole. In this analysis, characteristic dimensions in tension and compression were evaluated using the point stress failure criterion and joint bearing failure evaluated using the Yamada–Sun failure criterion. Results were compared with available experimental data for joints made from AS4/3501-6 graphite epoxy composite laminates and good correlation observed when evaluated as function of edge distance to hole diameter. However, the analysis yields conservative results when joint strength is evaluated as a function of plate width to hole diameter.