Acoustic emission characteristics of unidirectional glass/epoxy composites under mixed-mode fracture

Delamination is one of the most critical failure modes of composite materials and structures. An approach to avoid conservative designs is to use more damage tolerant composite materials. For this approach to be successful, a reliable structural health monitoring system is required to detect and identify damage during operation. In this paper, the link between mode mixity and acoustic emission characteristics is investigated. While there is a large body of research on analysis of acoustic emission for different materials and loading cases, the current work is focused on simple acoustic emission features and examine their dependence on a wide range of mode mixities. It is shown that there is a strong dependence of the acoustic emission characteristics on the mode mixity and in particular between mode I dominated and mode II dominated fracture. The results obtained could be used to develop tools to identify the type of delamination in composite structures during operation.

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