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ESTIMATING THE SIZE DISTRIBUTION OF THE FIBER/MATRIX INTERFACE CRACK IN MICROSTRUCTURAL MODELS OF UD AND CROSS-PLY LAMINATES BY A LINEAR ELASTIC FRACTURE MECHANICS APPROACH

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The recent interest in *thin-ply* laminates for advanced applications [1] has led to a renewed focus on transverse cracks onset. Tranverse cracking manifests itself at first in the form of fiber/matrix interface cracks (debonds), that propagate along the arc direction of the fiber surface and coalesce together to form a continouos through-the-thickness crack. Characterization of this process has been mainly directed to the evaluation of the Energy Release Rate (ERR); however, the attention has been devoted to the study of a central partially debonded fiber placed in an effectively medium and the effect of nearby fibers [2]. In this work, the ERR in Mode I and Mode II is evaluated for debonds appearing in Representative Volume Elements (RVEs) of regular microstructures of UD and cross-ply laminates. We then consider a mixed-mode criterion for propagation and analyze the effect of the size of the initial flaw and of the mode mixity parameter, thus leading to the estimation of the expected size distribution of a debond in these representative microstructures. Finally, the results are compared with available microscopic observations [3].

Figure 1. The former cloister of the convent of St. Domènec, which is the venue of this conference.

References

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