ESTIMATING THE AVERAGE SIZE OF FIBER/MATRIX INTERFACE CRACKS IN UD AND CROSS-PLY LAMINATES

Luca Di Stasio^{1,2,*}, Janis Varna², Zoubir Ayadi¹

¹ Université de Lorraine, EEIGM, IJL, 6 Rue Bastien Lepage, F-54010 Nancy, France
² Luleå University of Technology, University Campus, SE-97187 Luleå, Sweden
* luca.di.stasio@ltu.se

Characterization of fiber/matrix interface cracks (debonds) has mainly focused on the evaluation of the Energy Release Rate (ERR). However, the attention has been mainly devoted to the study of a central partially debonded fiber placed in an effectively infinite medium and to the effect of a small number of nearby fibers on debond ERR [1]. In this work, the Mode I and Mode II ERRs are evaluated for debonds appearing in Representative Volume Elements (RVEs) of regular microstructures of UD (Fig. 1) and cross-ply laminates. By adopting a 2-parameters energy-based criterion for propagation [2], we then proceed to the estimation of the expected average debond size in different microstructural arrangements (see Fig. 1). Finally, the results are compared with available microscopic observations [3].

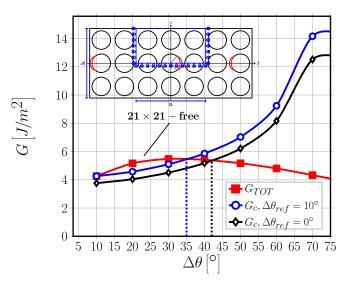


Figure 1. Estimation of debond size by comparing the total ERR to the 2-parameters expression of critical G_c . Glass fiber/epoxy, $V_f = 60\%$, $\varepsilon_x = 1\%$.

References

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