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Erergy Release Rate Approach for Delamination in a Fatigue Crack Configuration in Glare

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Glare is a Fibre Metal Laminate developed at Delft University of Technology, consisting of thin aluminium and S2-glass fibre layers, and it will be applied in the upper fuselage of the Airbus A380. Due to the brigding fibres, the fatigue crack propagation behaviour is excellent, showing very small and approximately constant crack growth rates. From previous investigations it was found that the bridging stress varies along the crack length and depends on the delamination shape. The bridging stress needs to be determined, to describe the stress intensity at the crack tip in the aluminium layers. To incorporate the delamination, the delamination growth was investigated using the 2D delamination specimen configuration. For this configuration the Energy Release Rate can be derived, which can be related to the delamination growth using a Paris type relation. This relation is determined for different Glare grades (unidirectional and cross-ply) and corrected for the effect of the stress ratio.

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