Fatigue crack growth in mode II of adhesively joined composites

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The structure of a wind turbine is exposed to a complex multi-axial cyclic loading. The blades are commonly manufactured of adhesively joined composites. Adhesive joints are usually strongest if loaded in shear and accordingly fatigue properties in shear are important. In the current paper, experiments are performed to derive material data for a crack propagation in shear i.e. in mode II. The shear loading of the crack is achieved by use of double cantilever beam specimens loaded with uneven bending moments. The experiments are performed under a constant cyclic displacement. An initial mode I loading is used to make the crack start in the adhesive. The crack length is measured using a load synchronized camera. Due to the shear loading the crack deviates from the adhesive layer into the laminate. A stable crack propagation is detected in the laminate. No influence have been detected due to an increasing crack length. It is also observed that the crack is trapped in the laminate; if the loading is changed to mode I the crack continues to propagate in the laminate.

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