Chair of Carbon Composites
Department of Aerospace and Geodesy
Technical University of Munich

Term Project, Master's Thesis

Optimization of Split Disk Test Specimen Geometry using FEA

Carbon Fiber Reinforced Polymer (CFRP) manufacturing technologies have advanced to enable the fabrication of complex surfaces subjected to stress states that require individual study and analysis. One example is composite-overwrapped pressure vessels (COPV) which have a cylindrical shape. Many projects at the Chair of Carbon Composites focus on such pressure vessels to investigate their potential benefits for sustainable applications (e. g. in the mobility sector). A fundamental understanding of their mechanical behavior is thus important. To characterize these vessels, split disk tensile tests are performed using ring-shaped specimens with notches designed to ensure failure due to tension in the area of interest. However, in some laminates with fiber orientation close to the load direction the desired failure between the notches is not achieved.

This investigation aims to optimize the notch geometry using Finite element analysis (FEA) to test different laminate orientations and geometries to achieve the desired failure mode.

Figure: CFRP Pressure Vessel www.innovationin-textiles.com/successful-carbon-fibre-recovery-from-pressure-vessel/

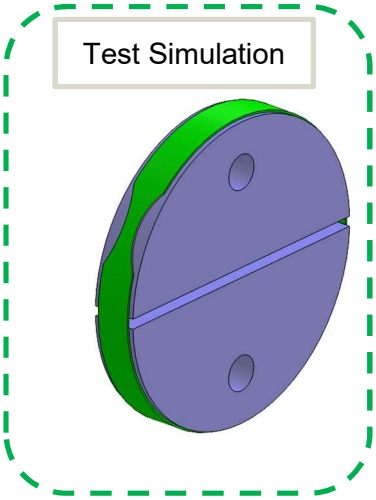

Figure: Split Disk Test (Illustrative)

Figure: Split Disk Tensile Test (LCC Lab)

Research focus of the thesis

- Literature review on Split Disk Tensile Test
- Modelling the Split Disk Test in the FE software Abaqus
- Optimization of specimen geometry
- Perform tests for experimental validation (Master's Thesis)

Requirements

- Basic understanding of mechanics of materials, finite element modelling and scripting (Python)
- Experience with FEA Software and basic knowledge of fibre-reinforced composites would be beneficial
- Structured and independent work ethic
- Language: English

Starting date: Now

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