

Structural integrity under extreme loads

Topic: Advanced Modelling of Composite Structures

TITLE: Optimization and Design of Composite Pressure Vessels Stacking Sequence

RESEARCH BACKGROUND:

H2 is becoming increasingly appealing as an energy carrier for heavy-weight fuel-cell electric vehicles (FCEV). Due to the low volumetric energy density of H2, its use in FCEVs is possible only when stored at extremely high pressures (350 bar and 700 bar). Composite pressure vessels are the natural choice for a light-weight, high strength design.

Aim of this thesis is the development and implementation of numerical algorithms for the design of optimal COPV stacking sequences.

RESEARCH ACTIVITIES:

1. Acquisition of fundamental COPV knowledge and the filament wound structures.
2. Review of the literature illustrating the current optimization algorithms for the design of COPVs.
3. Reproduction of the most promising sizing algorithms, validation against literature test cases, and possibly their improvement.
4. (Possible burst tests on COPV domes and final validation of FE models.)

METHODOLOGY: Numerical, Analytical – (Experimental)

DURATION: 6-9 months

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