

PhD Grants from the China Scholarship Council: Co-operation Program with the UTs and INSAs (France), Program 2023

Thesis subject :

Experimental and numerical investigation of a joining process for a composite/metal assembly

Keywords:

joining process, hybrid structure, property, simulation

Description:

Nowadays, the combination of polymer composite with metals knows a growing interest. Thus, the joining processes of composite onto metal is one of the key problems to be solved for diverse use, to keep abreast of improvement in different industries [1-2]. This is the major objective of this PhD works that focuses on the suitable joining process for a hybrid structure made of polymer composite part and metallic part. For that purpose, the research works include three significant work packages.

A first part includes an experimental work for successfully joining the hybrid assembly. Various material combinations will be investigated and compared. This work also includes the investigation of the suitable processing conditions with the optimization of the structural hybrid cohesion within the assembly

The second work package is focused on the mechanical properties of the interfacial bond, that consists of an analysis and a characterization of the structural integrity of the hybrid assembly. We will investigate the hybrid inter-material cohesion through experimental test combined with a numerical simulation. This experimental part relies on the mechanical characterization of the hydride interface behavior using various mechanical tests (dynamic impact, bending test, and tensile tests). The coupling with a computational analysis will enable to understand the interface mechanical response including the event of decohesion that can prevail for such hybrid assembly. Models of hybrid interfaces behavior will be developed for that purpose. Numerical simulation will be performed using Comsol Multiphysics and Abaqus 6.14 software packages.

The third parts will provide the correlation between the bonding capability of the hybrid assembly and the monitorable parameters of the joining process.

Expected background of the PhD candidate :

Mechanics of materials, materials characterizations, process optimization, finite element simulation

Supervision of the research works :

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References

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