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Master Transports Aéronautiques et Terrestres

Lab: P' PMM, ENSMA - Poitiers

Internship supervisors: Marco Gigliotti, Jean-Claude Grandidier

Funding: P' DPMM Lab

Simulation of the creep behaviour of thermoplastic matrix composites for aircraft applications

Context: Organic Matrix Composites for aircraft applications

Skills: Mechanics of materials, ABAQUS FEM code

Type of work: Numerical

PhD: Funding for a PhD thesis (start: October 2016) will be available within the framework of the ANR IMPEKKABLE project led by AIRBUS Group Innovation

This internship is placed within the framework of ANR IMPEKKABLE research project, led by AIRBUS GROUP INNOVATIONS. Aircraft manufacturers aim at integrating thermoplastic matrix organic matrix composites within structural parts of aircrafts submitted to aggressive environments (high temperatures, gas pressure ...) where thermomechanical couplings and degradation/ageing phenomena may take place. For parts working at relatively high temperatures, creep and creep/ageing interaction phenomena may take place; therefore a detailed understanding of such phenomena is needed.

The aim of the internship is to simulate the creep behaviour - possibly affected by the ageing - of thermoplastic laminated composite materials. By the employment of constitutive laws developed in the lab for composite with thermoset matrix ([1], [2]) ABAQUS FEM simulations will be carried out on simple structural configurations (laboratory samples), to test the pertinence of the developed laws and for the design of laboratory tests.

High-temperature creep tests will be possibly carried out to identify and validate the developed models.

[1] Gigliotti et al., Local Shrinkage and Stress Induced by Thermo-Oxidation in Composite Materials at High Temperatures, JMPS, 59: 696-712, 2011

[2] Minervino et al., A Coupled Experimental/Numerical Approach for the Modelling of the Local Mechanical Behaviour of Epoxy Polymer Materials, JMPS, 67: 129-151, 2014

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