Title: Calorimetric manifestations of failure mechanisms within thermoplastic composite materials: application for fatigue life prediction of composite automotive components

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Short description of possible research topics for a PhD:
This PhD project aims at investigating the leading failure and damage mechanisms involved during the short-term (impact) and long-term (fatigue, creep, etc.) deformation of fiber-reinforced thermoplastics (e.g. internal storage and release of energy, irreversible phenomena due to dissipation, thermomechanical coupling, etc.). Coupled to efficient mathematical framework and its related algorithms, this research work will involve two full-field measurement techniques (digital image correlation and infrared thermography) and finite element modeling investigations. The outcomes of this research work will mark a major leap forward into the thermomechanical consistency of some classical constitutive models used in the automotive industry for structural durability prediction. It also will shed a greater insight on the various relations that may exist between the internal microstructural transformations occurring into the composite material and the energy terms arising from the inelastic deformation.

Required background of the student:
Applicants should have, or expect to achieve at least a Master’s degree (or an equivalent overseas degree) in Mechanical Engineering, Materials Science, Applied Mathematics or a related subject. Candidates with suitable experience and strong capacity in numerical modeling, experimental testing and/or measurement skills are particularly welcome to apply.

A list of 5(max.) representative publications of the group: (Related to the research topic)