

Research Topic for the Arts et Métiers ParisTech - CSC PhD Program

Subfield: Mechanical Engineering.

ParisTech School: Arts et Métiers – ParisTech

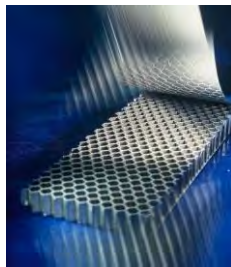
Title: Characterization of mechanical strength of high performance structural adhesives using full-field strain measurements.

Advisor: Professor Halim HADDADI, halim.haddadi@ensam.eu, <http://aa1.free.fr>

Short description of possible research topics for a PhD:

Structural adhesives are developed to bond plastics, composites and metals. They offer simultaneously strength, toughness and ease of use. Now, they are proving in various applications in the transportation vehicles and building structures. The name “structural adhesives” means that they are designed to bond two surfaces to make a load-bearing structure. It is admitted that the shear strength of these joints must be greater than 10 MPa.

This PhD project deals with the development of an accurate protocol of mechanical characterization of the structural adhesive using high resolution digital image correlation and a finite element model updating strategy. The mechanical strength of the adhesive joint will depend on the surface preparation and the bonding parameters (thickness, temperature, applied load during bonding ...). Finally, numerical cross-curves will be determined in order to correlate the obtained mechanical performances of the adhesive joint with the surface and bulk properties and the processing parameters.



Structural adhesive films
[<http://solutions.3m.com>]

Required background of the student:

- Mechanical engineering, Mechanical behavior of materials
- Finite element method and Matlab tools will be appreciated.

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

- H. Haddadi, S. Belhabib, (2012), Improving the characterization of a hardening law using digital image correlation over an enhanced heterogeneous tensile test, International Journal of Mechanical Sciences, 62, 1, 47-56.
- H. Haddadi, S. Belhabib, (2008), Use of rigid-body motion for the investigation and estimation of the measurement errors related to digital image correlation technique, Optics and Lasers in Engineering, 46, 185-196.
- S. Belhabib, H. Haddadi, M. Gaspérini, P. Vacher, (2008), Heterogeneous tensile test on elastoplastic metallic sheets: Comparison between FEM simulations and full-field strain measurements, International Journal of Mechanical Sciences, 50, 14-21.
- H. Haddadi, S. Bouvier, M. Banu, C. Maier, C. Teodosiu, (2006), Towards an accurate description of the anisotropic behaviour of sheet metals under large plastic deformations: Modelling, numerical analysis and identification, International Journal of Plasticity, 22, 2226-2271.

FOR APPLICATION, PLEASE CONTACT ADVISOR(S) BY EMAIL WITH COPY TO:
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