Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website www-csc.utt.fr)

Supervisor's name : GODIN Given names : Nathalie

Status (prof., assistant prof., …) : Associate professor

Laboratory : MATEIS Website address : http://mateis.insa-lyon.fr/en/

Institution : INSA of Lyon Website address : https://www.insa-lyon.fr/en

Scientific competence of the supervisor:

Nathalie Godin is an Associate Professor at the National Institute of Applied Sciences (INSA) in Lyon, France. She has 25 years of experience in damage detection and identification with AE in various kinds of materials. She focuses on fiber-reinforced composites as these materials have a variety of applications. She has authored over 80 articles, 6 book chapters and 2 books and has been an invited speaker at numerous professional research conferences. She is also a board member of the French Society for Composite Materials (AMAC) and of the European Society for Composites Materials (ESCM).

Two major publications in the field proposed for the PhD :

1. Towards quantitative acoustic emission by finite element modelling : contribution of modal analysis and identification of pertinent descriptors. Le Gall et al. Appl. Sci. 2018, 8(12), article number 2557
2. Reduction of the sensor effect on acoustic emission data to create a generalizable library by data merging, Xi Chen et al., accepted to Sensors 2024.

Website address of the personal page :

Supervisor's email : nathalie.godin@insa-lyon.fr

Description of the research work proposed for a PhD ***Topic # (see list) :*** IV.12

Title : Acoustic emission modelling : correlation between mechanical sources and AE descriptors.

Subject :

The context of this work is the modelling of acoustic emission (AE) during mechanical tests i.e. the wave propagation in the material due to fracture, in order to enrich the understanding of the use of acoustic emission during experimental tests. Acoustic emission is a non-destructive instrumentation that allows the detection of phenomena such as cracking, which dissipates elastic waves resulting from local crack-induced displacement jumps within the material. Sensors placed at the surface of the tested specimen allows capturing the specimen surface vibration that is collected as a signal that can be described in both time and frequency domain. A more quantitative relationship between the original wave emitted by the source (i.e. the crack), and the measured signal could be established by means of numerical simulation of the acoustic wave propagation from the source to the sensor. The aim is to establish the correlation between the AE signal descriptors (such as amplitude, frequency, ...) and the source of damage based on finite element simulations. This is essentially a numerical work, based on the simulation of sources of different sizes, positions and orientations together with subsequent wave propagation in a model material. The effect of instrumentation (sensor position, sensor choice, etc.) will also be simulated and discussed. This work is a continuation of Xi Chen's PhD thesis.

Keywords :

Acoustic emission, Modelling, damage, AE signal

Expected collaborations :

Background required from the applicant :

Master's degree in mechanics and/or acoustics with a strong knowledge of finite element modeling, and good understanding of acoustics and fracture mechanics.

Existence of a PDF file detailing the proposal ("yes" or "no") : yes

(see guidelines on the website www-csc.utt.fr)