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 : AOUES Given names : Younes

Status (prof., assistant prof., ...) : Associate Professor

Laboratory : Laboratoire de Mécanique de Normandie Website address :

Institution : INSA ROUEN NORMANDIE Website address : http://www.insa-rouen.fr/

Scientific competence of the supervisor:

Finite Element Method, Numerical methods, computational mechanics, structural reliability, topology optimization, vibration-induced fatigue, uncertainty quantification

Two major publications in the field proposed for the PhD :

1. Aoues, Y., Pagnacco, E., Lemosse, D., & Khalij, L. (2017). Reliability-based design optimization applied to structures submitted to random fatigue loads. Structural and Multidisciplinary Optimization, 55(4), 1471-1482
2. Khalij, L., Gautrelet, C., Guillet, A. Fatigue curves of a low carbon steel obtained from vibration experiments with an electrodynamic shaker. Materials and Design 2015, 86:640–648

Website address of the personal page :

Supervisor's email : younes.aoues@insa-rouen.fr

Description of the research work proposed for a PhD ***Topic # (see list) :*** VI-3

Title : Reliability-based topology optimization under random vibrations

Subject :

Topology optimization is an approach, that aims for achieving lightweight structure and high-performance requirements such as strength, stiffness, natural frequency, or buckling. Moreover, this methodology allows topological changes as well as structural shapes, thus can produce valuable designs for new structural functions. Moreover, topology optimization has changed the way we think about designing structures. Topology optimization was developed in the 90s by Bendsøe and Kikuchi. Since several works related to theories and techniques have been proposed to make topology optimization more efficient. Actually, the field of topology optimization is undergoing important academic development. it is now being successfully used for the design of several components concerning stiffness and strength, and several methods are proposed to take into account buckling constraints, eigenfrequency constraints. However, the topology optimization is based on a deterministic approach which does not take into account the variability of input parameters and the uncertainties related to design loading, and material properties. The integration of the probabilistic constraints into the topology optimization, lead to the so-called RBTO "Reliability-Based Topology Optimization". However, RBTO under random vibrations remains academic challenging. This work aims to develop an efficient approach for the new RBTO tool which allows considering the random vibration constraints.

Keywords :

Finite Element Method,opology optimization, random vibrations, structural reliability, probability of failure

Expected collaborations :

Background required from the applicant :

Engineering school or Master in Mechanical or Applied Mathematics solid background in mathematics and solid mechanics, Finite element method, probability theory, and probabilistic approaches.
Experience in numerical simulation on dedicated software (for example ANSYS, COMSOL, NASTRAN, etc.)
Good programming experience, Matlab, Python, or C ++.
Good communication in English (read and write)

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

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