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 : Berger | Given names : Sébastien

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

Laboratory : Laboratoire de Mécanique Gabriel Lamé | Website address :

Institution : INSA Centre Val de Loire | Website address : http://www.insa-centrevaldeloire.fr/fr/

Scientific competence of the supervisor:

Mechanical systems, nonlinear dynamics, stability analysis, friction-induced vibrations, nonlinear energy wink, uncertainties, chaos polynomial methods, robust conception, multiple scale analysis

Two major publications in the field proposed for the PhD :

1. B. Bergeot, S. Berger, S. Bellizzi, Mode coupling instability mitigation in friction systems by means of nonlinear energy sinks : numerical highlighting and local stability analysis. Journal of Vibration and Control, vol. 24,
2. M.-H. Trinh, S. Berger, E. Aubry, Stability analysis of a clutch system with multi-element polynomial chaos, Mechanics & Industry, vol. 17, number 2, 205, 2016, http://dx.doi.org/10.1051/meca/2015061

Website address of the personal page :

Supervisor's email : sebastien.berger@insa-cvl.fr

Description of the research work proposed for a PhD ***Topic # (see list) :*** VI-2

Title : Robust design of nonlinear passive absorbers for the mitigation of harmful vibrations in wind turbines

Subject :

With the tightening of the ecological transition, renewable energy sources as wind turbines are unmissable. Unfortunately, wind turbines can undergo unwanted harmful structural vibrations due for example to dynamic instabilities (mode coupling or flutter) or to resonance phenomena. As a consequence, vibration absorbers must be implemented to reduce these vibrations.

In this work, the absorber consists in a Nonlinear Energy Sinks (NES), i.e. a nonlinear damped oscillator which is able to mitigate and to dissipate the vibrational energy of the primary structure at which it is coupled by exploiting a phenomenon known as Targeted Energy Transfer (TET). Unlike conventional dynamic linear absorbers, NES are able to mitigate vibrations over a wide frequency range.

The main goal of the PhD work is to investigate the performance of such NES by means of numerical simulations and analytical treatments carried out on a reduced scale wind turbine model coupled to one or several NES. Possible uncertain parameters will be taken into account to propose a robust and optimal design of the absorber.

Keywords :

Mechanical systems, wind turbines, rotor induced vibrations, nonlinear energy sink, nonlinear dynamics, stability analysis, uncertainties, Chaos polynomial method, robust conception

Expected collaborations :

Laboratoire de Tribologie et Dynamique des systèmes - Ecole Centrale Lyon
Industrial partners

Background required from the applicant :

The candidate should hold an university degree (Master of Science or equivalent) in mechanics including necessarily a research internship. He/she should be comfortable with mathematical developments and program writing (programming languages as Matlab, Mathematica or Python)

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

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