



PhD within the framework of the European project (ETN) “ECO DRIVE”:

Advanced angular models and experimental tools for lightweight transmission line design

Context

This PhD position is part of the “ECO DRIVE” project, funded by the European Commission through the H2020 “Marie Skłodowska-Curie Innovative Training Networks” program (grant number 858018) and focusing on noise and vibration in eco-efficient powertrains of future vehicles. Different universities and companies in Europe are part of the project, which includes various training and exchange periods for all the PhD candidates involved.

The application context is the global design process for the next generation of electrified powertrains (including hybridized engines, electric motors, gearboxes, drivelines, etc.). The ongoing massive electrification of powertrains brings quite a large number of challenges in car industry, particularly in engineering and design concerning acoustic issues.

Scientific framework and global objectives

Emerging encoder measurements have been investigated for belt, gear and bearing monitoring in power transmissions. The instantaneous angular speed has gained a high level confidence and some original propositions in the modelling-associated phenomena emerge in the literature. Rotating components with a discrete periodic geometry (electrical engine, gears, bearings, timing belts, etc.) generate cyclic excitations that can be efficiently described in the angular domain and for non-stationary conditions. The PhD student will develop a generalized model of a complete transmission line in this new framework, from the engine to the wheels. This model will be benchmarked against measurements on a transmission test rig or vehicle in order to calibrate the torsional and non-linear parameters, to define the best location for angular measurements and to investigate potential improvements by passive or active damping components. The angular approaches suggested in both the experimental and simulation research activities will also lead to a new path for drive-transmission characterization (cyclic sources and mechanical transfer paths) through angle-time analysis tools with alternative signals like angular speed, position, vibration and current. These models will provide guidelines for measurement protocols used in TPA and source separation in order to take advantage of the non-stationary conditions.

Recruitment on the project is 36 months.

Candidates must have completed an M2 level with excellent academic results in vibrations and acoustics / applied mathematics / mechanical engineering; they must meet the eligibility conditions of ETN projects:

- no residence in France longer than 12 months in the past 3 years immediately before the date of recruitment
- not been involved in research for more than 4 years (full time equivalent) starting to count the date this person graduates his/her first MSc degree.

Results-oriented, with solid understanding of both scientific and industrial issues at stake, you can use your versatility to listen and convince your partners in this project.

You speak and write fluent English. You master basic conversation in French, or are strongly willing to learn in order to facilitate your daily life in Lyon. A third European language is a must.

Salary:

- Living allowance: 3783€/month
- Mobility allowance: 600€/month
- family allowance: 500€/month

Supervision

Professor Didier Rémond (LaMCoS) and Ass. Prof. Adeline Bourdon (LaMCoS), University of Lyon, will supervise the PhD.

The PhD will take place in France (Lyon), with 3 months with Siemens Industry Software (Belgium), 3 months with Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung (Germany), including a substantial salary and living allowance (supported by the EC grant allowed to the project).

Application is open from March to December, 2020; send a message to didier.remond/adeline.bourdon@insa-lyon.fr