

Chaire VOLVO : Solutions for the future of urban transport

PhD subject – September 2018 - Lyon

- Crankshaft Hybrid Control : reduction of torsional vibrations and acyclism -

Institut National des Sciences Appliquées de Lyon

Laboratoire de Mécanique des Contacts et des Structures UMR 5259

Context of the VOLVO Chaire

As part of its privileged partnership with INSA Lyon, the Volvo Group wishes to elaborate an ambitious research program in the field of transportation for both goods and people in urban areas to become a world leader regarding sustainable transportation solutions.

These solutions for tomorrow's transportation includes energy efficiency challenges of people and goods' displacement solution, novel and innovative vehicular architectures, incorporating new manufacturing technologies as well as functionalized materials and artificial intelligence integration benefiting of the use of data processing.

These solutions need a highly pluridisciplinary approach, profiting the INSA Lyon lab's large competences and forming the challenge of this industrial chaire.

In urban zones, the solutions of transport will have to, in a very close future, be neutral in polluting emission leading to the electrification of vehicles and infrastructures and to their energy optimization. The reduction of losses in the transmission drivelines is obviously a first source of progress but the organization of a car fleet is also a way of progress. The modular architectures offering capacities of transshipment of goods or energy capacities lead to problems of optimization particularly ambitious and eminently dynamic organizations.

In this context, the optimization of the motorizations passes by the hybridization and the elaboration of energy-efficient solutions while maintaining acoustic and vibratory corresponding performances in the urban uses. In the future, the new architectures engine will have to satisfy very demanding criteria been imperative by the new European standardizations. It's in this context that we should consider the present proposal of thesis.

PhD objectives

Within the LaMCoS, the PhD student will take in the work of the implementation of a concept of active shock absorber in rotation on the basis of existing developments in translation. The objectives aim at decreasing the present vibrations of twisting on architecture of internal combustion engine but also at limiting the acyclism of these architectures. Based on an analysis of the existing or known solutions, thus the work will consist in developing representative models of behavior on which one or several solutions of activation and/or control will be proposed. These solutions will be, as far as possible, then detailed by a technological point of view to be associated with the laws of control.

This complete model of the various constituent bricks will serve to validate a first estimation of the performance improvements while taking into account their energy balance. The non-stationary character of this behavior will be advantageously handled within the framework of the formalism of the angular approaches proposed besides in the laboratory. This formalism authorizes the separation of the cyclic phenomena associated to the acyclism from the vibratory phenomena in torsion and thus the adaptation and the application of various laws of control.

For more information please contact :

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Profile: Master degree level (engineering school if possible) in mechanics / vibrations / electronics, good knowledge of tools in mechanical design / simulation and experiment. Skills in signal processing, control and active systems are deeply wished.

Remuneration / place / beginning: at least 1900 euros monthly / Lyon / September 2018

Duration: 36 months

Application: send CV and motivation letter to: simon.chesne@insa-lyon.fr or didier.remond@insa-lyon.fr

LaMCoS website: <http://lamcos.insa-lyon.fr/>

Research team website: http://lamcos.insa-lyon.fr/front/equipe_activites.php?L=1&Equipe=4



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