Internship proposal for Engineering school/master 2 mechanics or acoustics students

Modeling the vibro-acoustic behavior of a surface ship at high frequencies

Duration:

6 months, starting in 2021

Locations:

- Laboratoire de tribologie et dynamique des systèmes – CNRS UMR 5513, Ecole centrale de Lyon, Ecully, France
- University of Nottingham, United-Kingdom (if possible with Covid-19)
- Naval Group, Ollioules, France

Context:

Predicting the vibro-acoustic behavior of a surface ship is of primary interest for the naval industry: the noise level on-board must satisfy regulations and should be kept low for comfort of crew and passengers. The radiated noise into water must be controlled to reduce the impact on the marine fauna. Prediction methods typically used in the industry such as the Finite Element Method (FEM) require a mesh to discretize the equations of dynamics. To properly describe the physical phenomena, this mesh needs to be finer as frequency increases, leading to prohibitive calculation cost above several hundreds of Hertz for a full-scale surface ship. Over the last decades, statistical approaches have been developed to propose an alternative to FEM at high frequencies. These methods are based on the analysis of the energy flow between subdivisions of the system.

Objectives:

The goal of this internship is to benchmark two vibro-acoustics modeling approaches for high frequencies: the Dynamical Energy Analysis (Nottingham) and CeReS (Ecole centrale de Lyon).
The work will be organized as follows:

- Literature review of high-frequency methods in vibro-acoustics;
- Analysis and comparison of the assumptions of the two methods;
- Definition of a simple test case and comparison of the two methods;
- Application to a full-scale surface ship.

Contact:

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