

# MetaMan: Reduction of machinery ship noise using metamaterials: objective and economic evaluation

Record number : OPR-731

## Overview

### RESEARCH DIRECTION

Olivier Robin, Professeur - Department of  
Mechanical Engineering

### INFORMATION

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### ADMINISTRATIVE UNIT(S)

Faculté de génie  
Département de génie mécanique

### LEVEL(S)

2e cycle

### LOCATION(S)

Campus de Sherbrooke  
Fjord du Saguenay

## Project Description

**CONTEXT:** The reduction of underwater noise is becoming an important issue to preserve the environment of marine fauna. Machinery is the main source of noise at low speeds and in port areas. This noise is mostly tonal (i.e. generated at specific and energetic frequencies), and difficult to reduce with traditional materials. This project aims to implement and test a solution that specifically targets the reduction of this noise. The proposed solution, resonant metamaterials, has already been tested in the aeronautical and automotive fields, but its application to the maritime domain constitutes an innovation. The relevance of this solution will be evaluated on objective aspects, such as the reduction in terms of decibels of acoustic and vibratory levels. The economic aspects of the implementation of this solution and its gain on the environmental aspect will also be taken into account. This multidisciplinary project is being carried out in partnership between two faculties of the University of Sherbrooke (Faculty of Engineering, School of Management), an applied research center affiliated with the Institut maritime du Québec (Innovation Maritime) and partners from the maritime community such as the « Alliance Éco-Baleines ».

**ROLES AND IMPLICATIONS OF THE STUDENT:** The student will be specifically in charge of (i) carrying out a bibliographical study on metamaterials, their implementation and numerical simulation of solutions, (ii) 3D-printing and testing in laboratory the selected solutions and (iii) participating in their evaluation (vibroacoustic measurements and analysis on a boat in the Fjord-du-Saguenay area). This subject allows the development of skills in applied research, vibroacoustics and noise control. It is expected that the master's degree will be held mainly at CRASH center at the University of Sherbrooke, with regular collaboration with the School of Management and visits to Innovation Maritime, in order to provide a global training experience. Complementary and free courses can also be offered through the « Centre Compétences Recherche + ».

**CANDIDATE PROFILES:** graduate in mechanical engineering or physics, student from engineering school (France or other country) with ideally a specialization in acoustics and vibrations.

## Discipline(s) by

## Funding offered

Yes

# sector

## Sciences naturelles et génie

Génie mécanique

The last update was on 12 March 2024. The University reserves the right to modify its projects without notice.