The **NSERC CREATE Training Program for Offshore Technology Research (OTR)**

Welcome

The NSERC CREATE Training Program for Offshore Technology Research (OTR) is an opportunity for highly-qualified personnel to study, research and intern in the growing offshore industry and build on the research strengths associated with Canada's research priority on natural resources and energy.

The program currently has over 30 students enrolled in graduate studies. To date, 12 of our 18 graduates have joined industry with six continuing on to pursue further research and education.

In this inaugural issue of our newsletter three of the research projects untaken by our students are highlighted.

Wei Qiu, Program Director

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Projects

Seakeeping Experiment of Two Side-by-Side Floating Bodies

MEng Candidate: Doug Smith
Supervisor: Dr. Wei Qiu

This research was driven by the need to improve seakeeping predictions for floating bodies at close proximity. When multiple floating bodies are subjected to waves their proximity influences the fluid behavior in the water column between them. At close proximity fluid resonance can be observed in the gap region which causes instabilities in numerical models that predict single body seakeeping problems with good accuracy.

Methods have been proposed that add artificial damping to the gap region to deal with resonating frequencies in multiple floating body cases. Due to the lack of data available for numerical model validation for multiple floating body cases, an innovative model scale experiment was performed obtain a better understanding of the fluid behavior in the gap region. The experiment examined the effects of the wave heading and gap width on the fluid behavior in the gap region and the motion response of two semi-captive floating bodies.

This data is published in a thesis and it is anticipated that it will advance the numerical research for multiple floating body seakeeping predictions. Improved predictions will be valuable to hydrodynamic analysis for offshore transfer scenarios, multi-vessel operations, along with moonpools and multi-hull vessels.

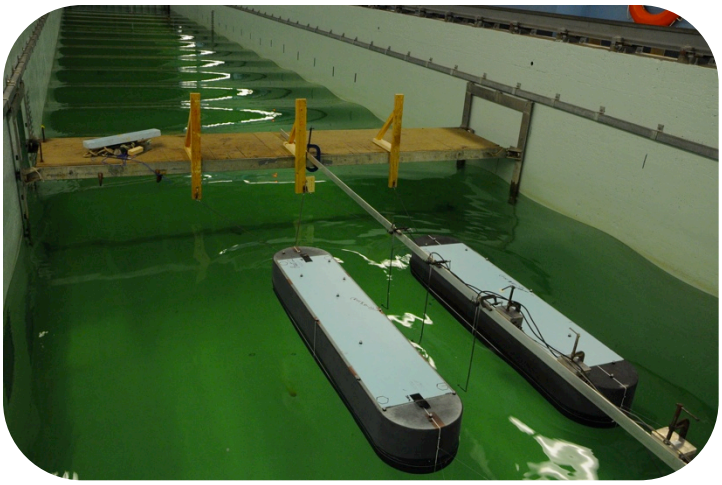
Model Scale Experiment being conducted at Ocean Engineering Research Center (Memorial University)

Numerical Simulation for Ship Maneuvering and Path Following in Level Ice

Masters Candidate: Quan Zhou
Supervisor: Dr. Heather Peng

Estimating the performance of a vessel or an offshore structure operating in an ice-covered region will become a crucial issue as the interests of exploiting oil and gas in Arctic and sub-Arctic keep increasing. It has been announced that as much as 20% of undiscovered oil and gas resources exists in this area. Further growth of exploiting activities in this region can be foreseen. Another motivation to this study is the possibility of transporting cargo or oil through Northern Sea Route.

This research is focuses on ship-ice interaction and ship motion response. A numerical solution has been applied, and a standalone program has been developed to simulate ship manoeuvring in level ice conditions. The program solves ship-ice interaction within water plane and is able to investigate various ship maneuvers. The program is developed in time domain so that time history of ice load distribution is available, which could be used as inputs for the structural assessment of ice going vessels. Ship motions are also included. The program can be used in conjunction with other algorithmns to study Dynamic Positioning or Autopilot in ice field.



Model Scale Experiment being conducted at Ocean Engineering Research Center (Memorial University)

In this research, a guidance and control system is also designed as a preliminary study of ship autonomous operation in ice. The system is designed with Line-of-Sight (LOS) guidance algorithm and PID control law. Numerical simulation results indicate the ship-ice interaction program is able to join to other program for advanced usage. The results also indicate LOS and PID is a sufficient solution for autonomous operation in ice.

Although this research focuses on level ice conditions, it will be extended to 3D ship-pack ice interactions in future work. The final product will be a versatile program with application in shipbuilding, field installation and the development of simulators for training,

The ultimate program could be used in many ways. It could be used to develop simulator for training pilot. Ship building and field installation operation could also benefit from by conducting full scale simulation.

OFFSHORE TECHNOLOGY RESEARCH

An NSERC CREATE Program

For More Information:

The **NSERC CREATE Training Program for Offshore Technology Research (OTR)**

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