

H2020 SOCIETAL CHALLENGES

Climate action, environment, resource efficiency and raw materials

The Industrial Problem

Development of a vessel draft prediction tool for the optimization of port management.

Research group



Instituto
Tecnológico
de Matemática
Industrial



UNIVERSIDADE DA CORUÑA

Center for technological research in the field on Industrial Mathematics: Modelling, Simulation, Optimization & Big Data (MSO & Big Data).

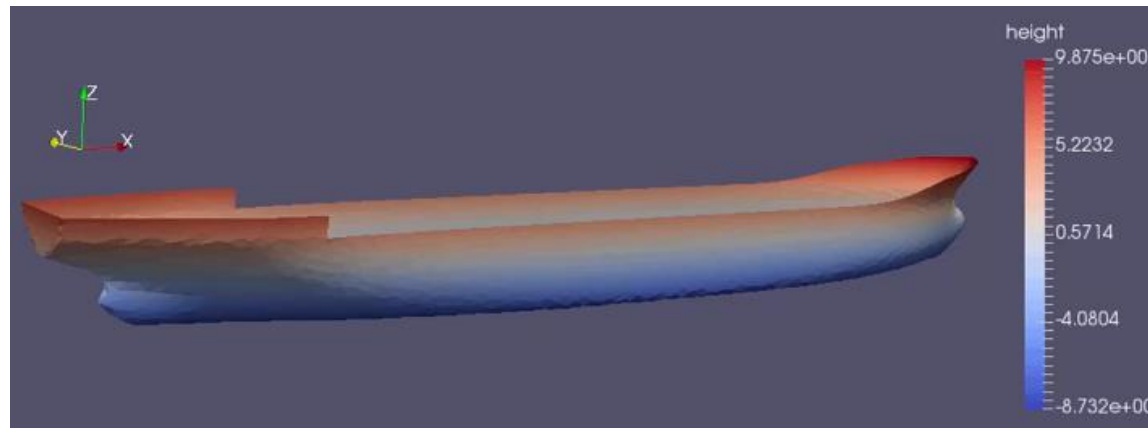
Company



i4sea, is a company specialized in oceanography technologies, whose main activity is to eliminate uncertainties of the ocean's economic sectors through innovative tools.

Challenges & Goals

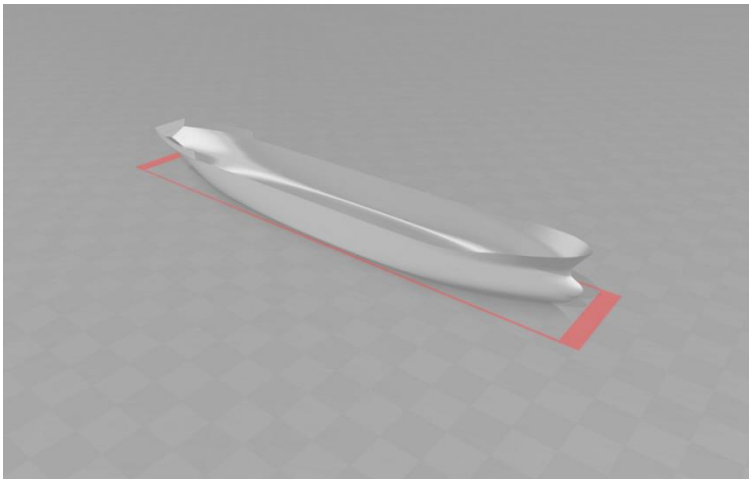
- Identification of the most relevant hydrodynamic phenomena under constant environmental conditions.
- Mathematical modelling of the hydrostatic and hydrodynamic problems and its numerical resolution to obtain the dynamic draft of a ship.



Height with respect to the sea free surface at the hydrostatic equilibrium position, plotted on the vessel hull

Mathematical and computational methods and techniques applied

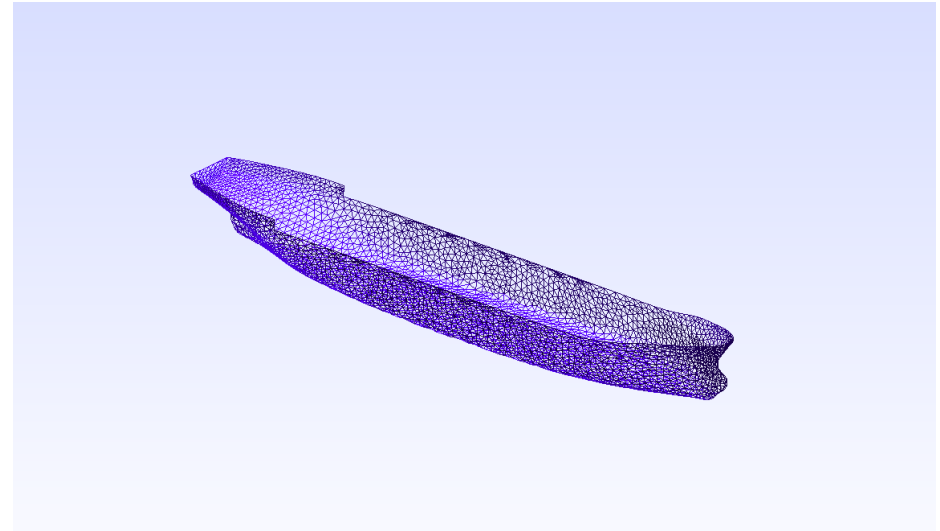
- **Hydrodynamic model:** linear, incompressible fluids and use of velocity potentials.
- **Physical problem with unbounded domain:** PML technique (Perfectly Matched Layers).
- **Computational domain:** Automatic generation of geometries and meshes.



CAD model: geometry of the vessel hull

Results & Benefits to the Company

- The computation of the dynamic draft using the ShipFEM code is efficient and accurate.
- This code has been included in the port consulting tool: i4cast.
- Its integration leads to a more complete and **competitive tool in the market**.
- An **intelligent system** that helps in **making decisions** through monitoring.
- **Prediction** of oceanic and climatic conditions.
- **Simulation of the influence** of environmental conditions on port operations in each vessel.



CAD model: triangular mesh generated automatically

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