Re-examining traditional net designs

Within the demersal fishing industry there is increasing interest in the selection of the catch within the net, fuel reduction and lowering disturbances to the seabed. This has inspired the FishNetSIM project which aims to develop a modelling framework to assist in the traditional net design process. One of the main aims is to reduce fuel consumption by minimising the impact of dragging the nets.

The numerical modelling framework consists of coupled CFD and time-domain codes: CFD calculates the flow in the net and loads on the net, while time-domain calculates the deformations. The time-domain solver uses constraint dynamics (CoDy) to calculate the deformations.

This constrained dynamics modelling technique is an alternative to the traditional mass-spring-damping modelling. Traditional modelling causes small time steps in a simulation with a lot of connected bodies, such as a fishnet structure. In the CoDy model, the distance between two bodies is constrained. This technique improves the calculation time of a net panel.

Alongside the time-domain model, the loads on and flows in the net structure are analysed with a porous medium model in the CFD software ComFlow. A coupling framework between the ComFlow and constrained dynamics model will result in a model that could be used for net optimisations in the future. The bottom friction model is developed by TU Delft and the forces due to soil mechanics are applied to the net in the time-domain model.

Two sets of basin tests were performed to obtain validation data and prior to the start of the project, a full-scale trawler net was tested in the Seakeeping and Manoeuvring Basin. This resulted in visual results on net deformations and towing forces in the net. The second set of tests were performed in a saltwater basin at the Visserij Innovatie-centrum. Net sections and seabed friction were tested and this delivered data on towing forces on the net, flow profiles in the net sections and visual observations on the net sections.

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