Prawn Trawl Shape due to Flexural Rigidity and Hydrodynamic Forces

By

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Abstract

Energy efficiency and ecological sustainability have become vital issues for the Australian and global prawn fisheries. The scientific community and innovative industry operators have introduced fishing gear modifications for drag and unwanted catch reduction. This project has investigated the potential for further drag reduction, focusing on the extent to which prawn net flexural rigidity affects the drag.

A novel experimental technique was developed to quantify flexural rigidity for nets. The concept of the technique was to measure the mesh opening under various loads applied in longitudinal and transverse directions. A relative difference between values showed a resistance of the mesh to bend, and the results were fitted into an existing analytical solution. The geometric parameters of nets were measured applying a digital photogrammetric method.

Four prawn trawls built from the netting being assessed for flexural rigidity were examined in a flume tank for drag and shape over a range of velocities. A stereo-vision system was developed to acquire the 3D shape image. The net flexural rigidity and drag showed a piece-wise linear relationship. Another main finding was that the drag coefficient was weakly dependent on the Reynolds number in the typical range for prawn trawl regimes of $1000<Re<1700$.

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