Study on hydrodynamic performance of a set-net in current based on numerical simulation and physical model test

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Abstract

Set-net is one of the important fishing gear and widely used in coastal and inland waters, because it has the advantages of simple operation and low energy consumption, which is beneficial for the protection of fishing ground environment at the same time. In addition, set-net is convenient for intensive fishery management and scientific research sampling. The hydrodynamic performance of a large Japanese style set-net in current was studied by means of numerical simulation and physical model test. A numerical model of the set-net was established based on the finite element method. The pipe element was used to model nets and cables. The equilibrium configuration and the tension distribution of the set-net was determined. Meanwhile, the model test of the set-net was conducted at the flume tank in Tokyo University of Marine Science and Technology, based on Tauti's law. The results showed that the simulated values and the experimental values agreed well. When the current velocity was about 1kn, the tension of the main cable was about 70 kN. The tension of the left main cable was slightly larger than that of the right main cable. The tension of the main cable was much larger than that of the side cable, and the tension was greatest in the whole system. The tension of the upstream part of the main cable was larger than that of the downstream part, and the tension of the net panel was smaller. With the increase of current velocity, the headline of the set-net was sinking, and the ground rope was floating upward. The deformation degree of the lead net was the largest, followed by the playground, and the deformation degree of the box chamber net was the smallest.

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