Evaluating the hydrodynamic characteristics and shape configuration of fine-mesh nettings for sampling nets

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INTRODUCTION

- Various types of trawling gear have been developed for the collection of larval and juvenile fishes with a common characteristic being the use of fine-mesh.
- Fine-mesh netting presents increased resistance and a complex flow field due to its high solidity ratio and small twines diameter.
- Hydrodynamic performance of fine-mesh netting determining water exchange filtration efficiency and consequently impacting the operational effectiveness of the sampling nets.
- In this study, we investigate the hydrodynamic performance of fine mesh netting across various angles of attack, ranging from parallel to normal orientations.

MATERIALS AND METHODS

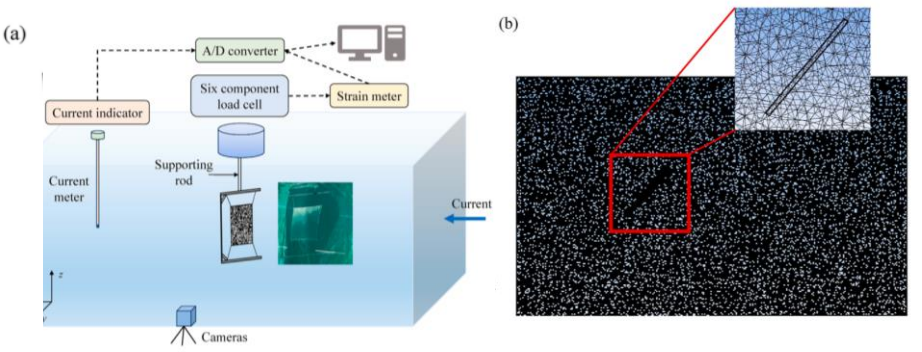
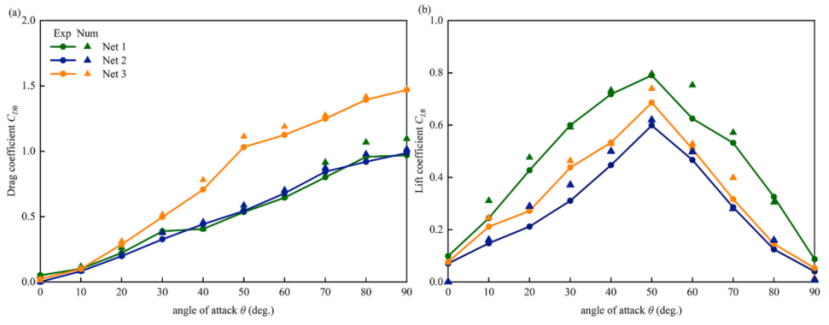


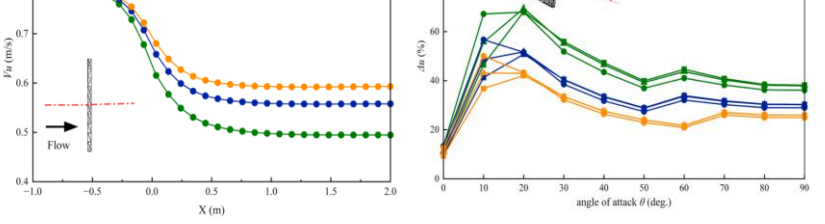
Fig.1 Schematic diagram for the hydrodynamic experiments and numerical simulation of fine-mesh nettings

RESULTS

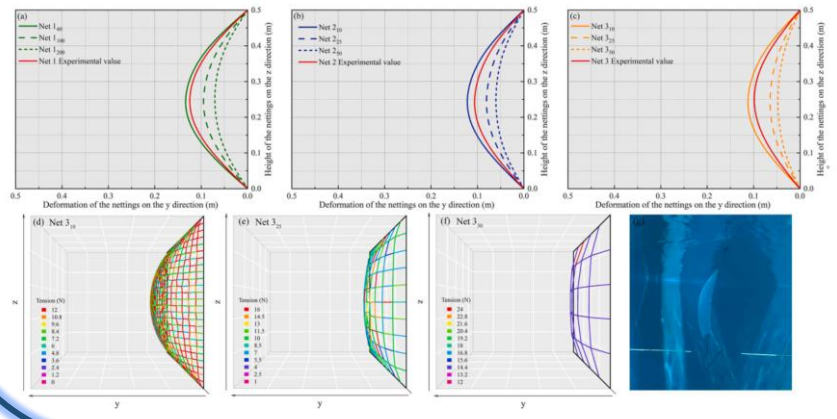
Drag and lift coefficients of nettings at inclination angles

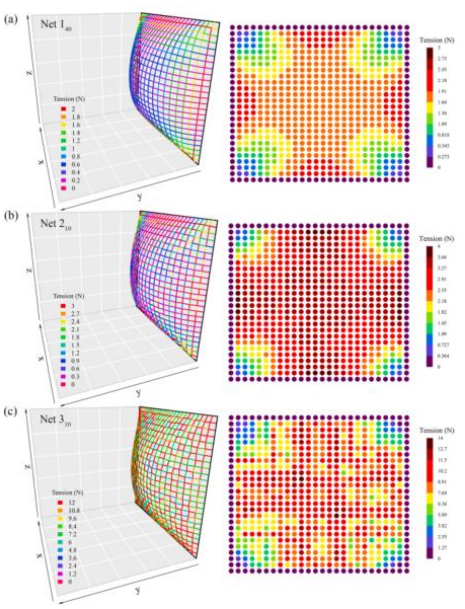


Velocity attenuation at the downstream of nettings

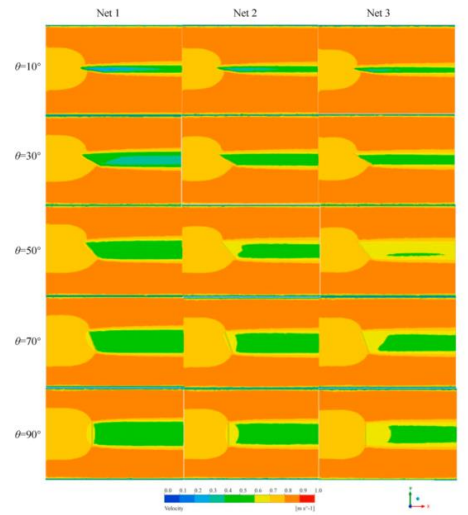


Deformation and tension distribution of nettings based on the lumped mass model





Flow filed distribution of nettings



CONCLUSION

- The simulated and experimental results indicated a gradual increase in drag coefficients with the angle of attack, while the lift coefficient exhibited an initial increase followed by a decrease.
- Velocity attenuation behind the nettings initially increases and then decreases with the angle of attack, while it consistently increases with the distance from the nettings.
- Increasing the mesh grouping ratio reduced netting deformation but intensified tension, and the optimal mesh grouping ratio was determined.
- Higher deformation corresponded to higher tension between mesh of the nettings.