Trajectory Guidance of Simulated Fish Catch in the Super Shoot TED Codend System

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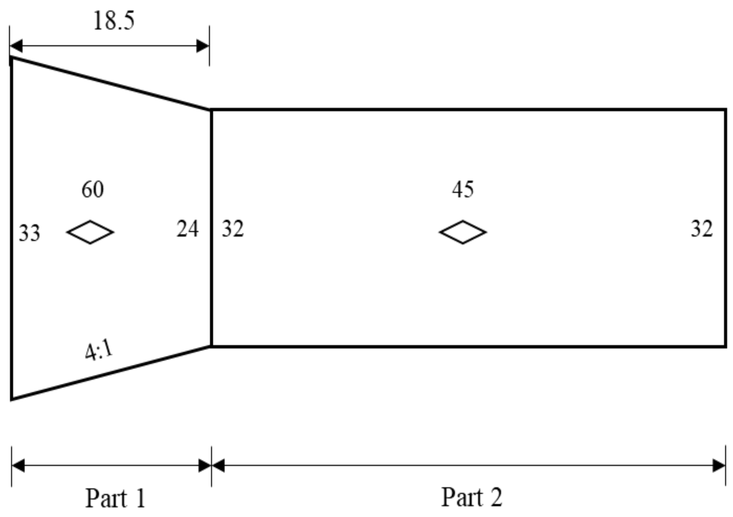
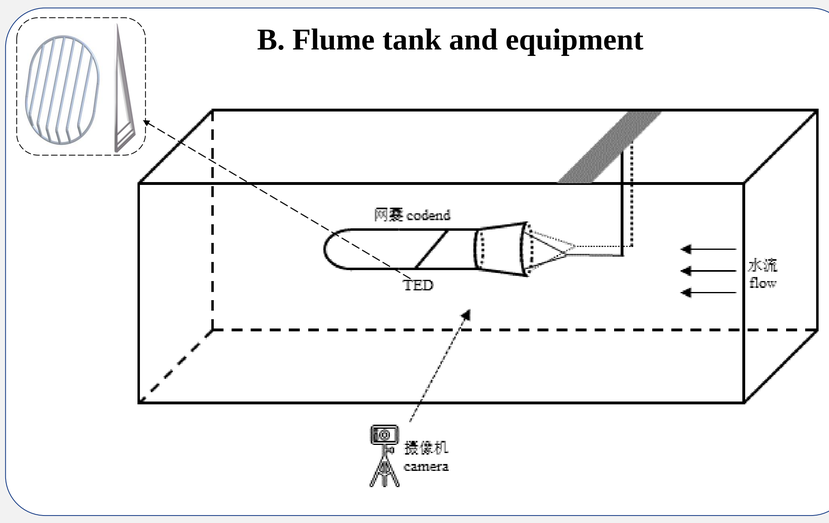
Experiment model

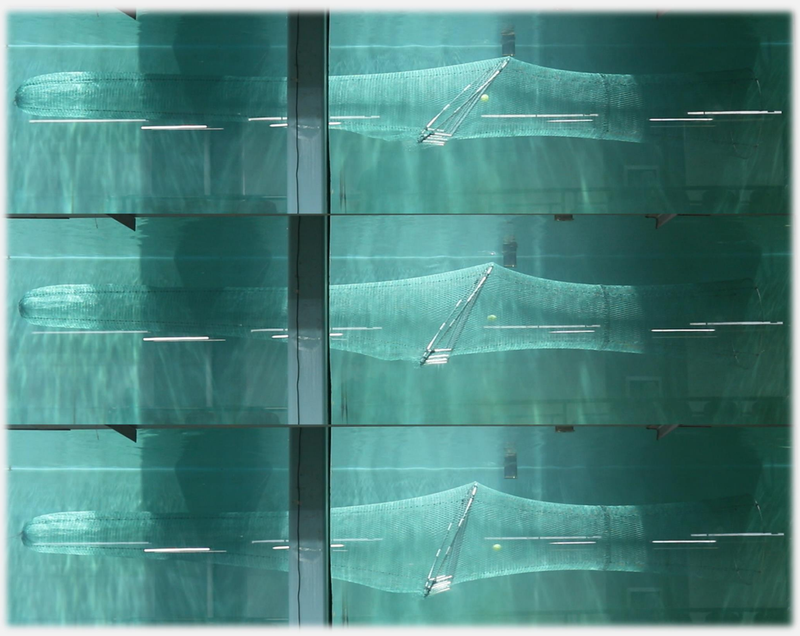
A. Model codend



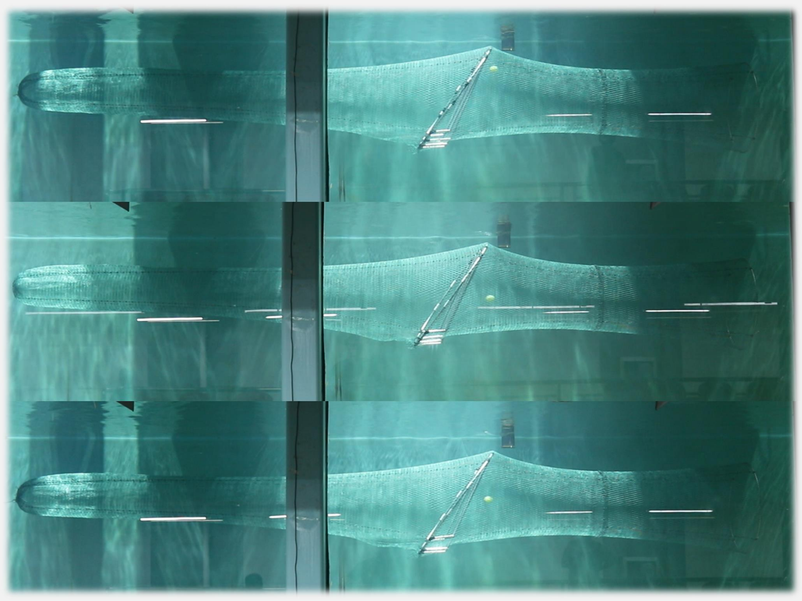
B. Flume tank and equipment



C. Real Images of Different Installation Angles



D. Real Images of Different Grid Spacings



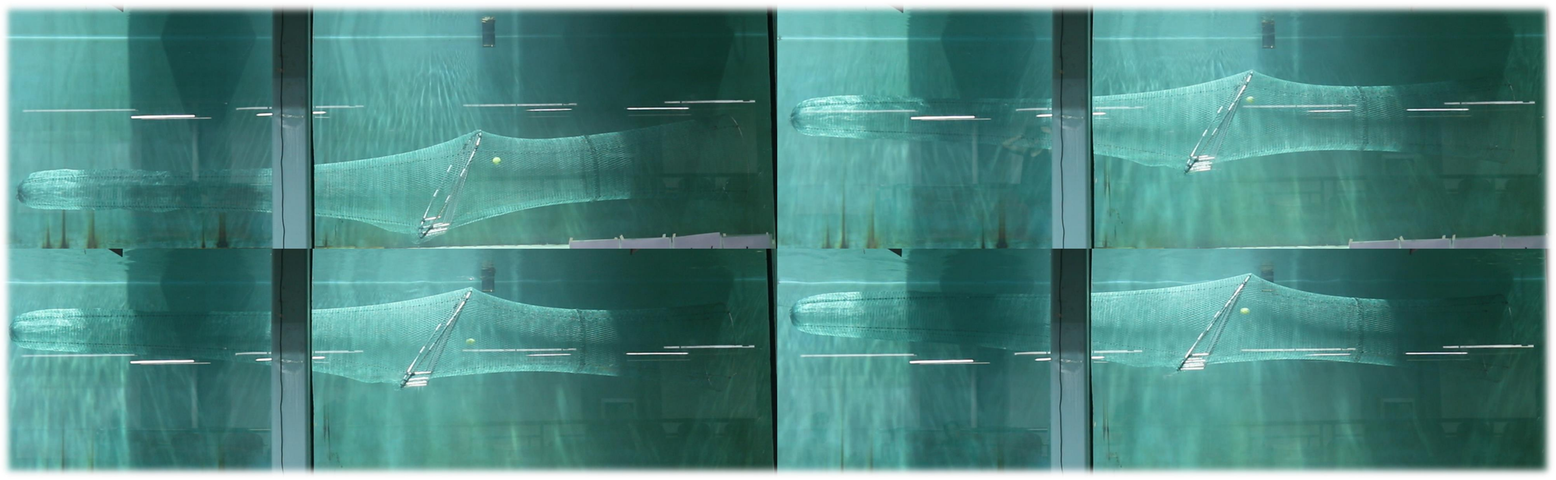
Conclusions

The different zones of the TED codend system have a significant impact on how catches move. This study's findings offer a scientific foundation for optimizing the Super Shoot TED design. They enhance our understanding of how catches behave when entering the codend, ultimately improving gear selectivity and the quality of the catch.

Background

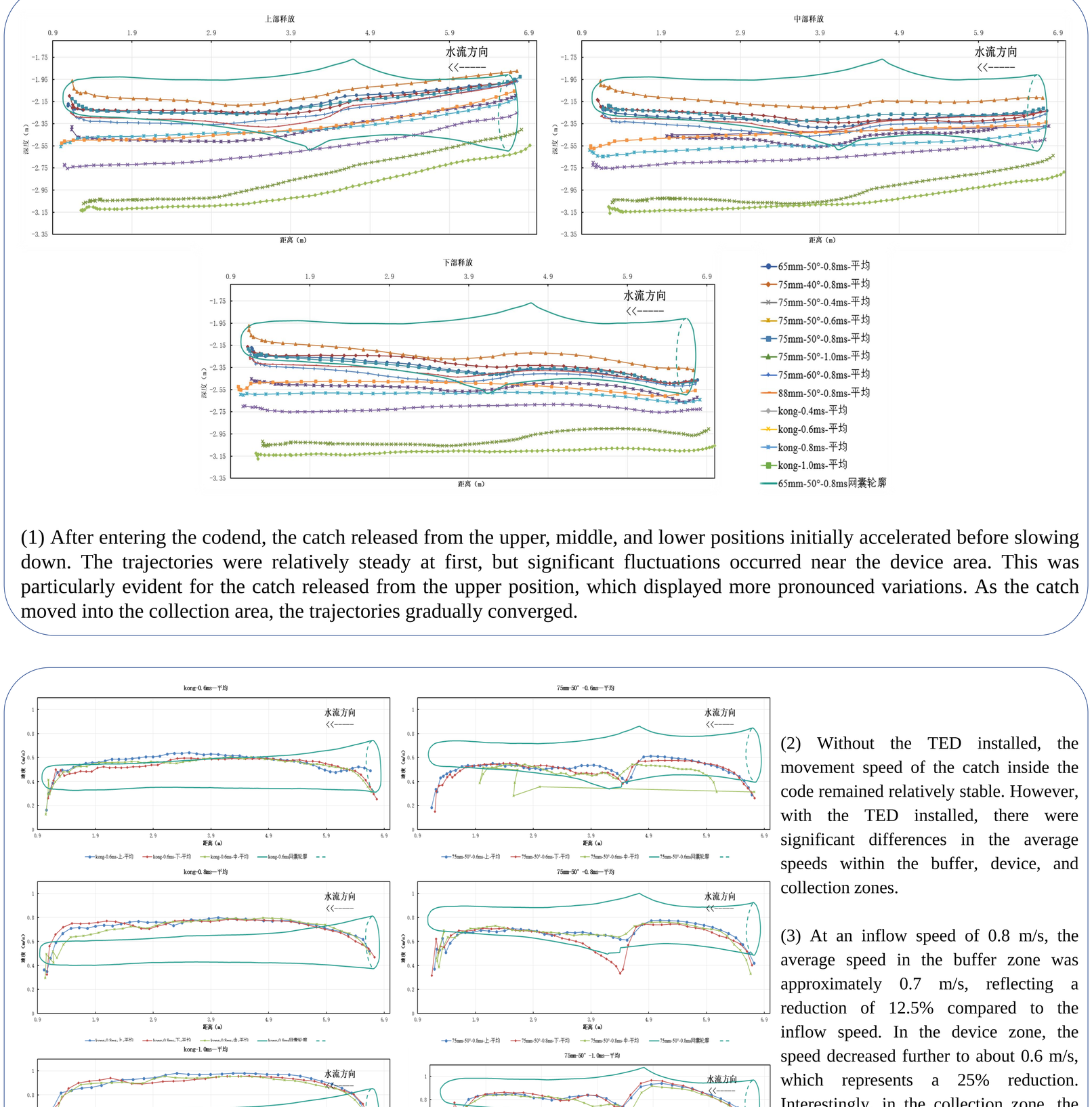
The Super Shooter is a Turtle Excluder Device (TED) used in trawl fisheries to prevent large non-target catches from entering the codend. While it has been effective in reducing sea turtle bycatch, more investigation is needed to understand how this device affects the guiding trajectories of target catches during the codend phase. To explore this, the present study conducted experiments in a flume tank to simulate and analyze how different orientations and grid spacings of the Super Shooter TED impact the trajectories of simulated catch in the codend.

Method



The TED was installed between the codend and the main body of the net. Elastic spheres, which simulated fish catches, were introduced at various positions at the entrance of the codend, and video recordings were taken during the process. The tilt angle of the TED and the spacing of the barriers were then adjusted, and the procedure was repeated until all variables had been tested. Software was used to extract the coordinates of the elastic spheres, calculate their speed, acceleration, and other parameters, and generate corresponding graphs for trajectory, speed, and acceleration.

Result



(1) After entering the codend, the catch released from the upper, middle, and lower positions initially accelerated before slowing down. The trajectories were relatively steady at first, but significant fluctuations occurred near the device area. This was particularly evident for the catch released from the upper position, which displayed more pronounced variations. As the catch moved into the collection area, the trajectories gradually converged.

(2) Without the TED installed, the movement speed of the catch inside the code remained relatively stable. However, with the TED installed, there were significant differences in the average speeds within the buffer, device, and collection zones.

(3) At an inflow speed of 0.8 m/s, the average speed in the buffer zone was approximately 0.7 m/s, reflecting a reduction of 12.5% compared to the inflow speed. In the device zone, the speed decreased further to about 0.6 m/s, which represents a 25% reduction. Interestingly, in the collection zone, the speed increased to 0.7 m/s, indicating an acceleration effect.