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IN CONFIDENCE - NOT TO BE QUOTED WITHOUT PRIOR REFERENCE TO THE LABORATORY

FRV GOLDSEEKER 8GR8

CRUISE 8/81

REPORT
27 July - 7 August

OBJECTIVES

To measure the hydrodynamic drag, at various speeds, of codends of different mesh sizes, hanging ratios and lengths.

GENERAL

'Goldseeker' sailed from Buckie on 27th July at 11.00, steamed to Inverness and entered the Caledonian Canal at 21.00. The scientific staff, with the gear and instrumentation, travelled to Fort Augustus by road. On 28th July the vessel steamed to Fort Augustus, arriving at 13.45. Trials were conducted at the south end of Loch Ness on the afternoon of the 28th, on the 29th and 30th, and on the 31st until 11.30 when 'Goldseeker' steamed to Inverness for the weekend.

On 3rd August 'Goldseeker' returned to Fort Augustus and scientific work began at 11.45. Trials continued on the 4th and were completed on the 5th. 'Goldseeker' returned to Buckie on the 6th, arriving at 19.00. The scientific staff returned by road to Aberdeen.

PROCEDURE

The codends were towed from 2.5m diameter rings made from 5cm diameter aluminium tube. Each ring had a 30mm mesh skirt supporting an inner ring of steel wire to which the codends were laced. Three towing rings were used, rigged with inner rings of 2.3m, 4.44m and 6.28m which corresponded to setting angles of 30°, 60° and 90°. Triple 10m bridles were used to tow the rings and a 47kg weight was used in most of the tests to keep the codends down when towing. In every haul the warp length from the towing point on the aft gantry was 60m. During each tow the parameters measured were: the combined bridle tension (using a 0.5 ton Japanese load cell), the warp tension and declination at the ship and the towing speed (using a towed log). Measurements were made at towing speeds between 1.5 and 4.5 knots.

All the codends tested were constructed from 364 m/kg nylon.

RESULTS

It was established by towing up and down the loch that there was no detectable tidal flow. This meant that adequate measurements could be made by towing in one direction, thus halving the time needed to measure the drag of each codend.

PTO

The programme of measurements was arranged using a 24m long, 40mm mesh codend with a 60° setting angle as a reference. The drag of this codend was measured at 4 knots and found to be 0.5 tons. The effect of various codend fastenings on the drag of this codend was investigated. Drag was measured with the codend loose, tied with a codline, set at 60° on a ring and with a PVC sheet laced to the same ring. There was no detectable difference between the measured drag in the first three cases but the PVC sheet increased the drag at 3 knots from 0.28 to 0.36 tons. All subsequent trials were made with the codends fastened with a codline.

A short strop was inserted in one bridle to tilt the towing ring by 20°. This did not measurably affect the codend drag.

The drag of the frame without a codend attached was measured twice during the trials and found to be about 0.14 tons at 4 knots.

The effect of codend length was studied by measuring the drag of 6, 12, 18 and 24m long codends of 40mm mesh size. The minimum drag was obtained with the 12m codend. It was observed that the 6m codend was held wide open in the water flow with no netting parallel to the flow direction.

The effect of setting angle on drag was investigated using 40mm mesh netting with setting angles of 90°, 60°, 45° and 30°. Drag values for the two higher angles were very similar and drag was much reduced at 30°. The tests were repeated using 100mm mesh netting and less difference was found with different hanging ratios.

The effect of mesh size on drag was investigated using 40, 50 and 100mm mesh netting; 50mm being the only available intermediate mesh size in the same twine size. Drag was found to decrease with increasing mesh size and there was a significant reduction between 40mm and 50mm.

The drag of two covered codends was measured: 40mm on 100mm and 40mm on 40mm. In the first case the measured drag was indistinguishable from that of a 40mm codend, but in the second case the drag was increased, particularly at low speeds.

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Seen in draft: James A Calder
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