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Is there the potential for energy harvesting at single point moorings?

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Lifeboats

The RNLI is the charity that saves lives at sea

Over 140,00 saved lives

20th March 2015

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Aims of experiments and modelling

1. Understand the patterns of behaviour by recording the motions and forces of a Lifeboat interacting with its mooring buoy in both testing tanks and at full scale.

2. Use the data to validate a computer simulation model to design the most effective configuration. Quantify the motions and forces and assess the potential and feasibility of energy scavenging at the mooring location.

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Systems and Information Management system

WITT (15 Kg) 1.3 kW
Gyroscopic WEC 100 kW
Powerbuoy 150 kW
Neptune 3.1 (2,200 Kg) 225 kW

☒ **The 932kW Caterpillar diesel engines**

☑ **The on board electronics or overnight heating**

http://rnli.org/aboutus/lifeboatsandstations/lifeboats/Pages/shannon.aspx

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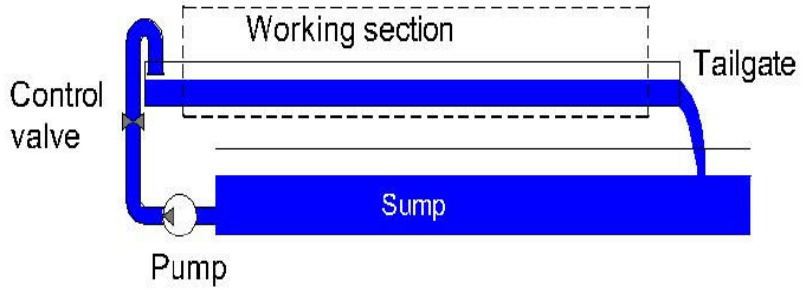
Flume test series 1



Myers and Galloway (2011)

- 6 Water depths + tidal flow combinations
- 3 Mooring Line lengths
- Scale and twice scale buoys, no buoy

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Flume test series 2

- Extra mass added to boat
- Different buoys tested

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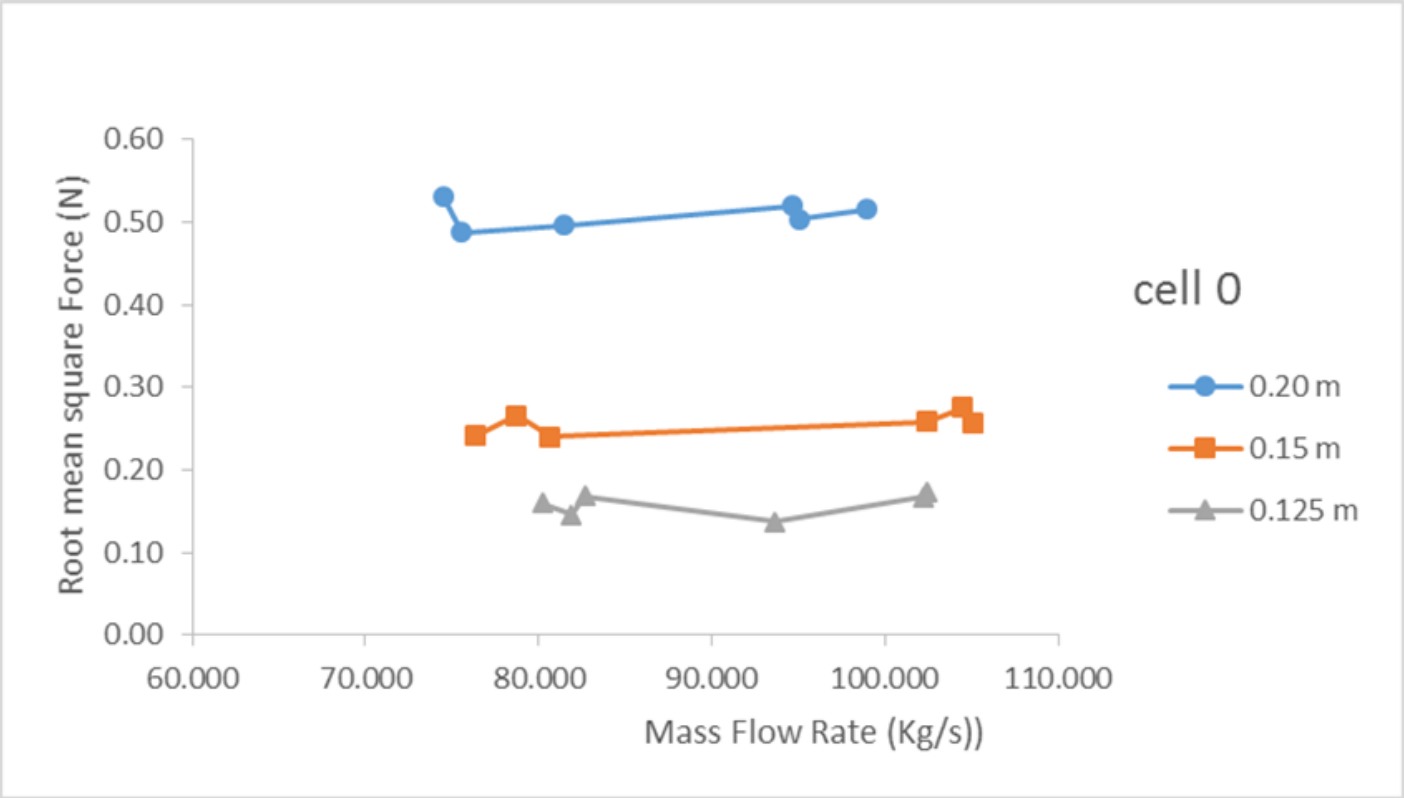
93 six minute tests were filmed and mooring force recorded.

Shorter mooring rope less average force



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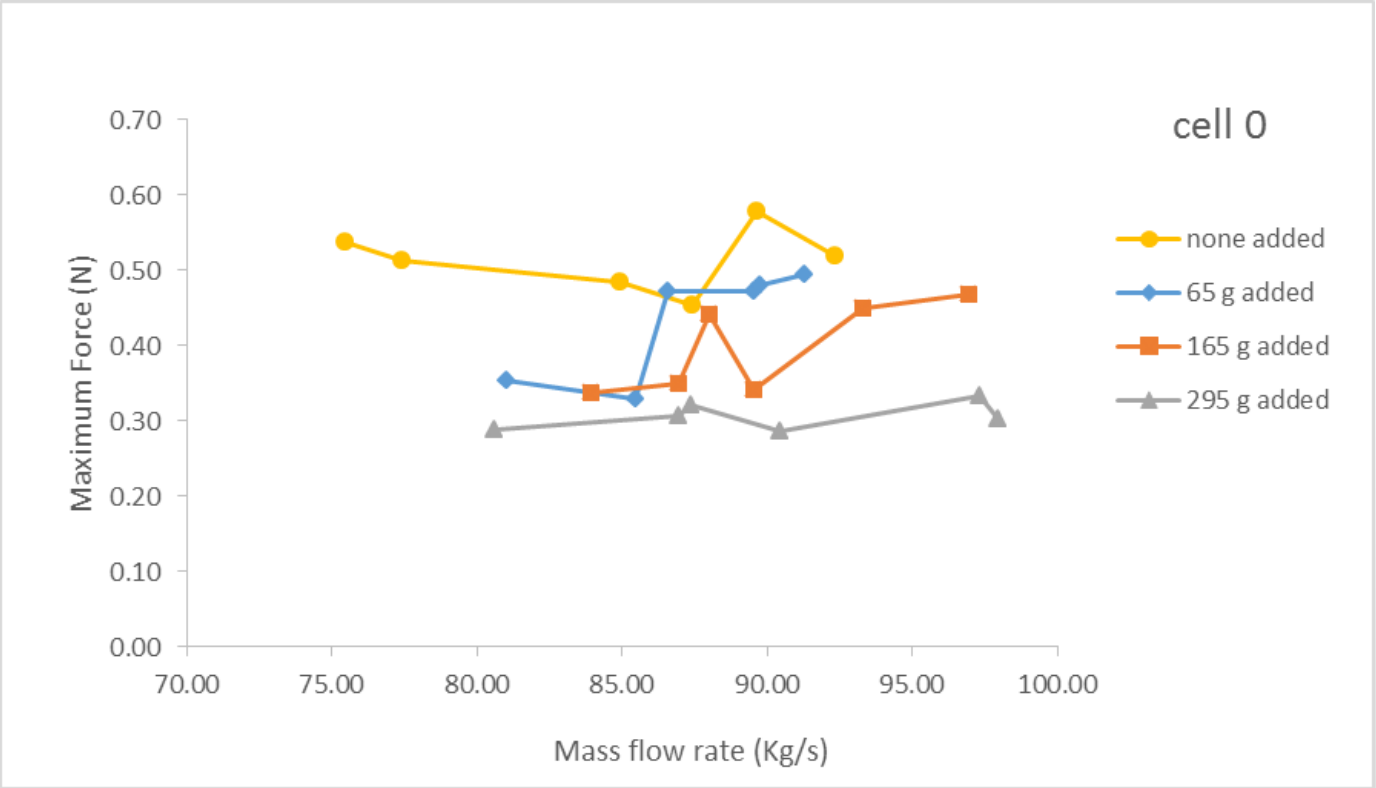
Heavier boat less maximum force



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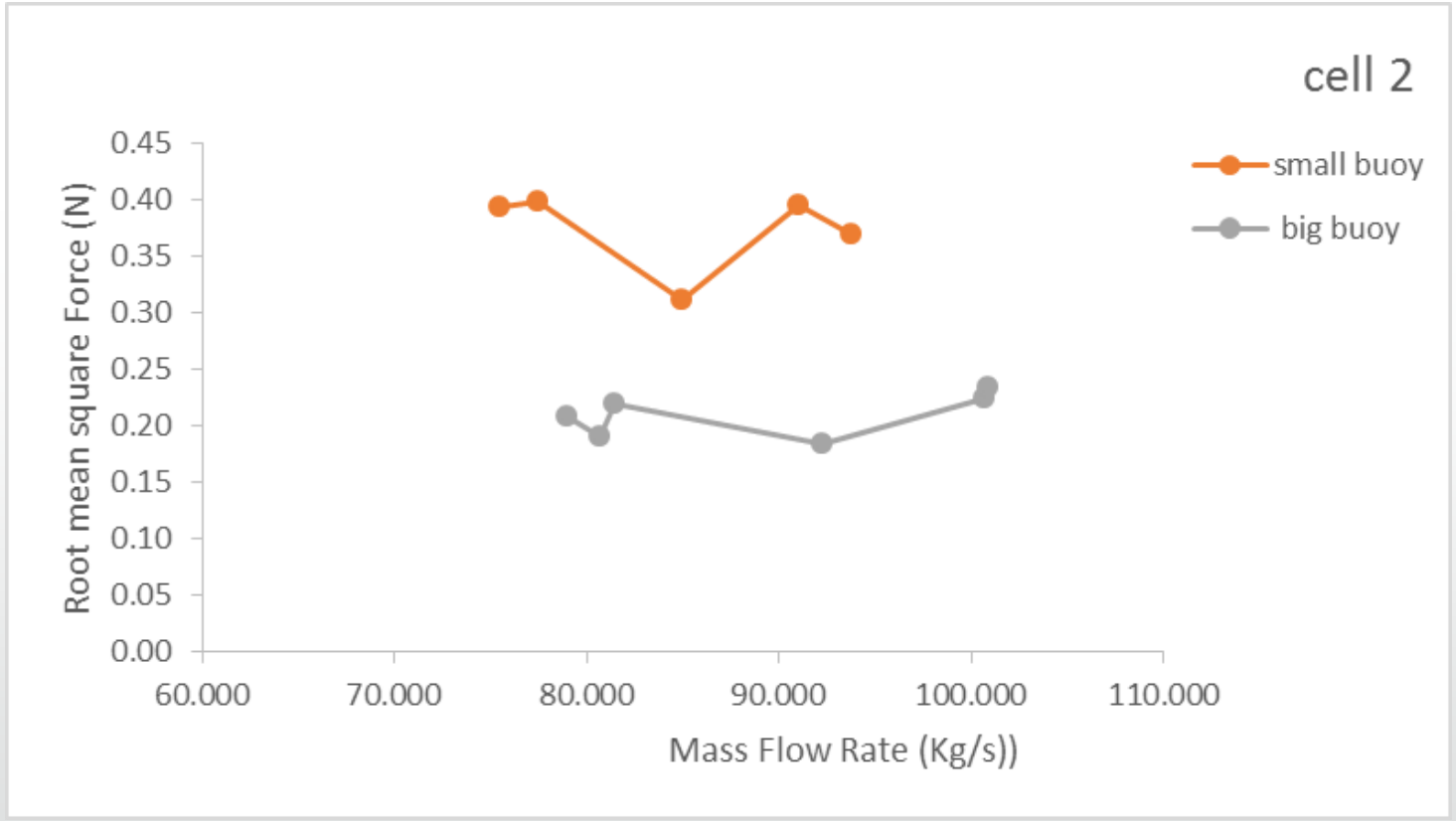
Larger sized buoy less average force



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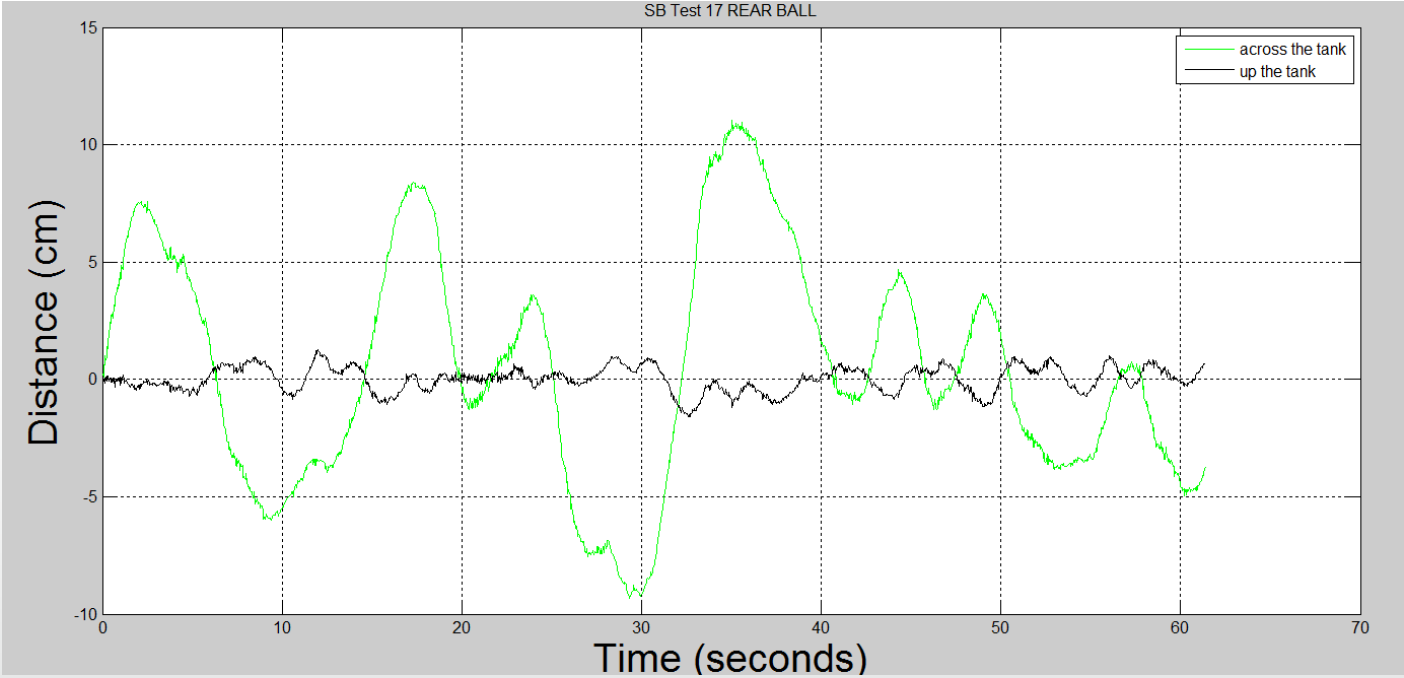
One minute of motion -fishtailing



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Next stages

- Correlation (ANOVA) analysis to interpret the load and motion data for different configurations.
- Merge a double pendulum motion model with catenary line dynamics to simulate observed fishtailing behaviour.
- Find optimal combination of line length, buoy shape and size to provide energy extraction from motions.

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Thank you