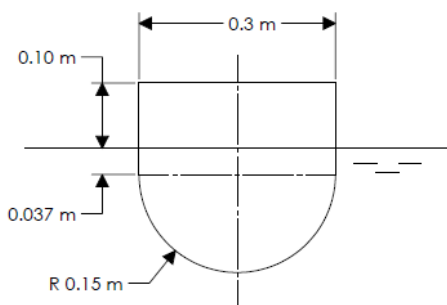
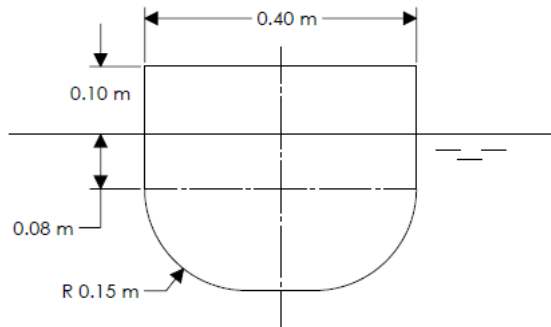


SPHERIC benchmark test case

| | | | |
|--|--|--|--|
| test case title | Free heave response of axisymmetric bodies with a round base | | |
| SPHERIC test case number | 14 | | |
| test case coordinators | Peter Stansby, Efrain Carpintero Moreno | | |
| organisation and country | University of Manchester, UK | | |
| email | p.k.stansby@manchester.ac.uk | | |
| Introduction Radiation damping is an important component determining the response of floating bodies. Drag also causes damping and cannot be separated. Radiation damping force may be estimated from a linear radiation coefficient from a standard panel method, e.g. WAMIT, and the remainder may be assumed to be due to drag, enabling an estimate of drag coefficient which may be compared with reference below (Gu et al 2018). In the experiment without any external constraint the motion provides a clean data set for validation of numerical models. | | | |
| Flow phenomena Radiation damping, drag, free response, axisymmetric bodies, hemispherical/rounded base. | | | |
| Geometry Axisymmetric floats, dimensions in metres: Float 1 mass 9.75 kg Float 2 mass 23.42 kg. <div></div> <div></div> CoG 0.090 m above base CoG 0.10 m above base | | | |
| Boundary conditions The body surface is smooth aluminium | | | |
| Initial conditions The water is stationary initially and body is released from rest, above or below water. The zero vertical level is when a stationary body is floating in still water. | | | |

Discretisation

The sample rate is 200 Hz. The displacement was obtained from a Qualisys motion capture system.

Results specification

The results simply show vertical displacement (mm) variation with time (s). They are shown in Figs.1, 2, 3 in section Benchmark Results. The error bars show range of values across tests and the line shows the mean values.

Results format

Three txt files with column 1 =time (s), column 2 = mean vertical displacement (mm) with sample rate of 200 Hz are:

Float1 offset-0.074 m : Fl1-0p074.txt,

Float1 offset+0.076 m : Fl1+0p076.txt

Float 2 offset-0.088 m : Fl2-0p088.txt.

Benchmark results showing mean and error bars

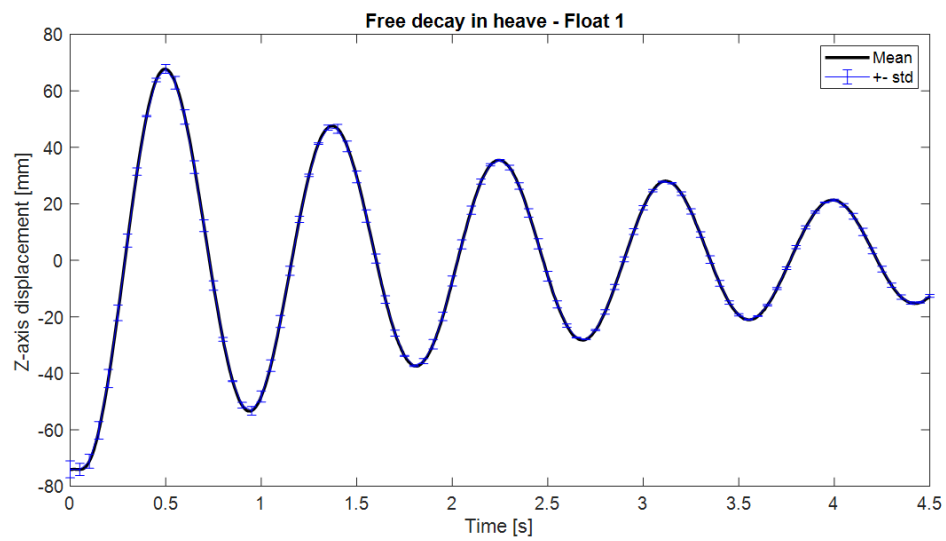


Fig. 1 Displacement (mm) time history of Float 1, initial offset -74 mm (mean of 2 tests)

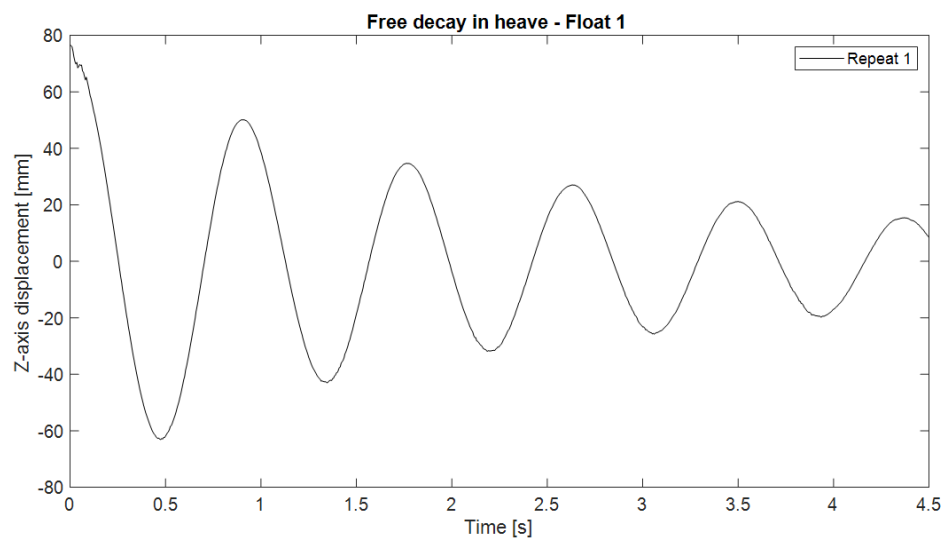


Fig. 2 Displacement (mm) time history of Float 1, initial offset +76 mm (one test)

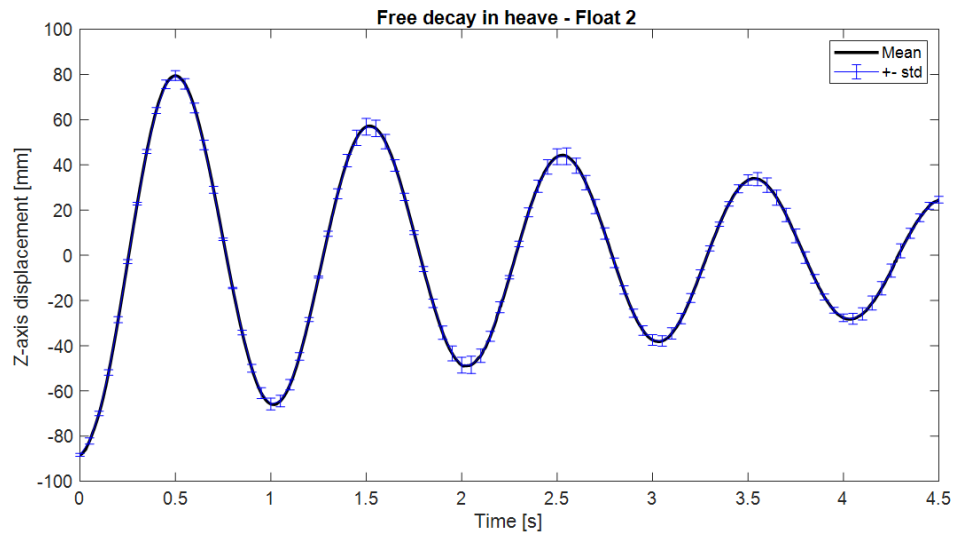


Fig. 3 Displacement (mm) time history of Float 2, initial offset -88 mm (mean of 3 tests)

Reference

Gu,H., Stansby,P., Stallard,T., Carpintero Moreno,E. 2018 Drag, added mass and radiation damping of oscillating vertical cylindrical bodies in heave and surge in still water, *J. Fluids Struct*, 82, 343-356. doi.org/10.1016/j.jfluidstructs.2018.06.012