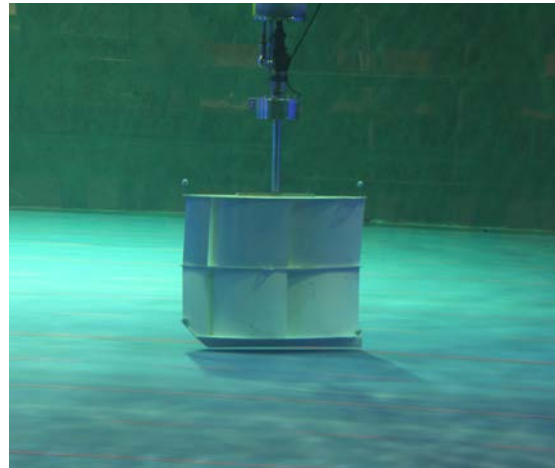
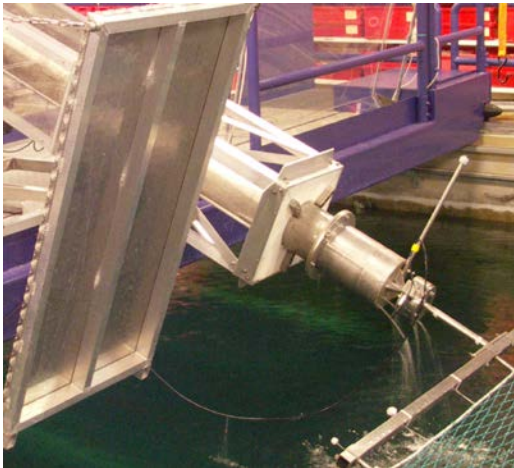


The North Sea Science Park Flume Tank

Managed and operated by SINTEF Ocean

Measurements of Forces and Moments in 3 Dimensions Acting on Solid Bodies



Instrumentation:

Motion Tracking

Motion tracking hardware and software from Qualisys is installed in the flume tank. The system consists of six cameras which can be submerged in the water enabling us to Track the motion of objects in a large volume of the flume tank. We have mounted four cameras on a beam in the aft end of the tank and two extra cameras further forward on a second beam to get a good coverage of the tank volume.

6- Axis Load Cells

The Force/Torque (F/T) sensor system measures the full six components of force and torque (F_x , F_y , F_z , T_x , T_y , T_z) using a monolithic instrumented transducer. The F/T transducer uses silicon strain gages for excellent noise immunity. The use of silicon gages allows the F/T transducer to have high stiffness and increased overload protection. All transducer models are available with Net F/T, DAQ F/T or Controller F/T interfaces. The actual load cell is equipped with a DAQ interface. The capacities of the load cells are shown in the second and third column in the table below.

Description	Omega 160	Delta
Max F_{xy} [\pm N]	± 2500 N	± 165 N
Max T_{xy} [\pm Nm]	± 400 Nm	± 15 Nm
Max F_z [\pm N]	± 6250 N	± 495 N
Max T_z [\pm Nm]	± 400 Nm	± 15 Nm

Suspension Tower

The tower is used to position the test object in the water. The tower can position the object in the water by lifting and lowering the attachment piece. The object can be rotated around the vertical axis by about 160 degrees (the attack angle of the water flow) and the pitch and roll angle of the object can also be manipulated by ± 20 degrees. The tower is bolted to the observation bridge running over the flume tank.

Analysis

Based on the forces and moment data retrieved from the load cells (www.ati-ia.com) and the geometry data retrieved with the Qualisys Track Manager system (www.qualisys.com) it is possible to obtain the forces and moments acting on an arbitrary solid body submerged in the water flow. The parameters can refer to either the global (flume tank) or the local coordinate system of the body in question. This analysis can be made immediately after the tests have been performed.

Photo left: Suspension tower with netting panel lifted out of the flume tank

Photo right: Lower part of tower, load cell and trawl door with reflectors in the flume tank.