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Hydraulics Facilities

Faculty of Engineering and the Environment

 www.facebook.com/Hydraulicslaboratory

Updated 10 Nov 2016

Hydraulic Engineering

Research is carried out on

- Generation of renewable energy from rivers and the ocean
- Fundamental fluid mechanics and sediment transport

We approach these topics using field as well as small and large-scale experiments. Facilities include indoor and outdoor flumes, wave tanks and state of the art measurement technology (LDA, ADV, PIV.

Experimental data are used to refine theoretical and numerical models with the aim of providing effective solutions for engineering problems.

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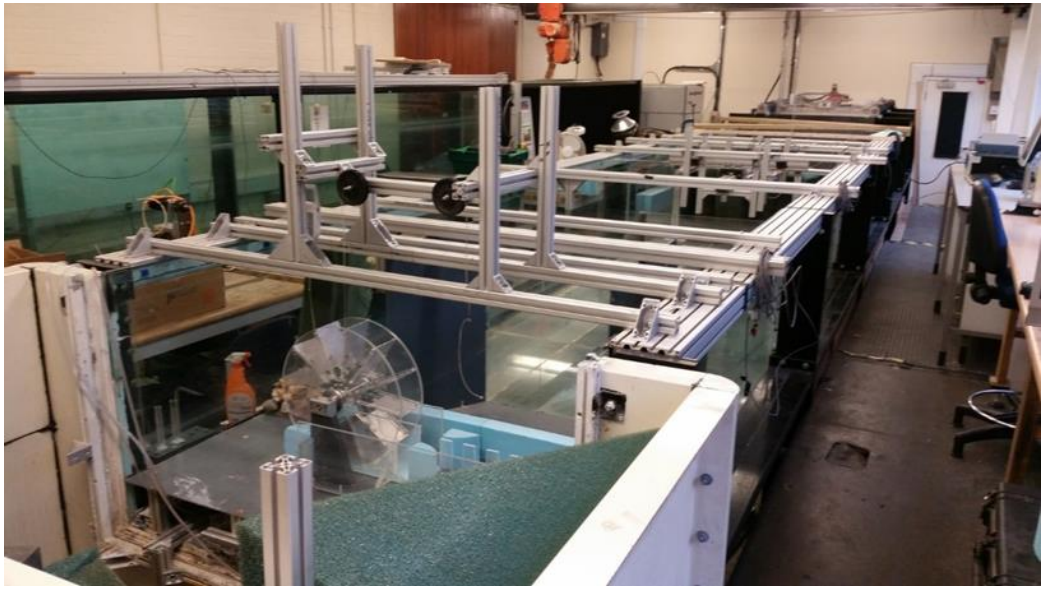
Main campus

At Highfield, we have two laboratories each of 110 m^2. They contain

- a 0.3 m wide, 0.4 m deep and 12 m long tilting flume
- a 0.4 m wide, 0.4 m deep and 14 m long wave tank
- a 0.5 m wide, 1.2 m deep and 15 m long wave tank with absorbing wave paddle, and
- a general purpose flume of 1.5 m width, 0.6 m depth and 6 m length



Above: 0.4 m wide wave tank

Above left: 12 m long flume

Below left: General purpose flume (foreground), 15 m wave tank (background)

Larger-scale wave tank experiments

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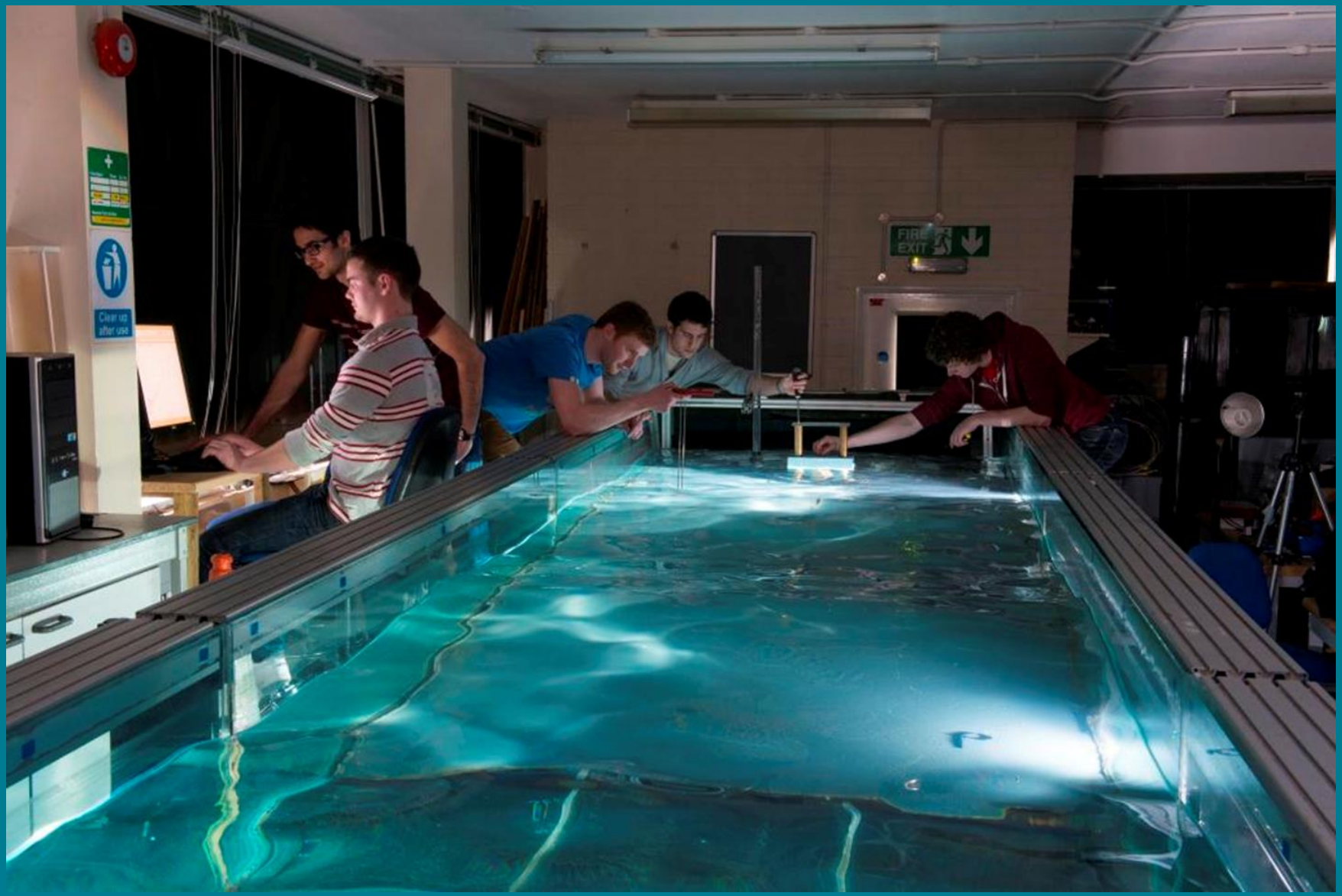

Smaller-scale wave tank experiments

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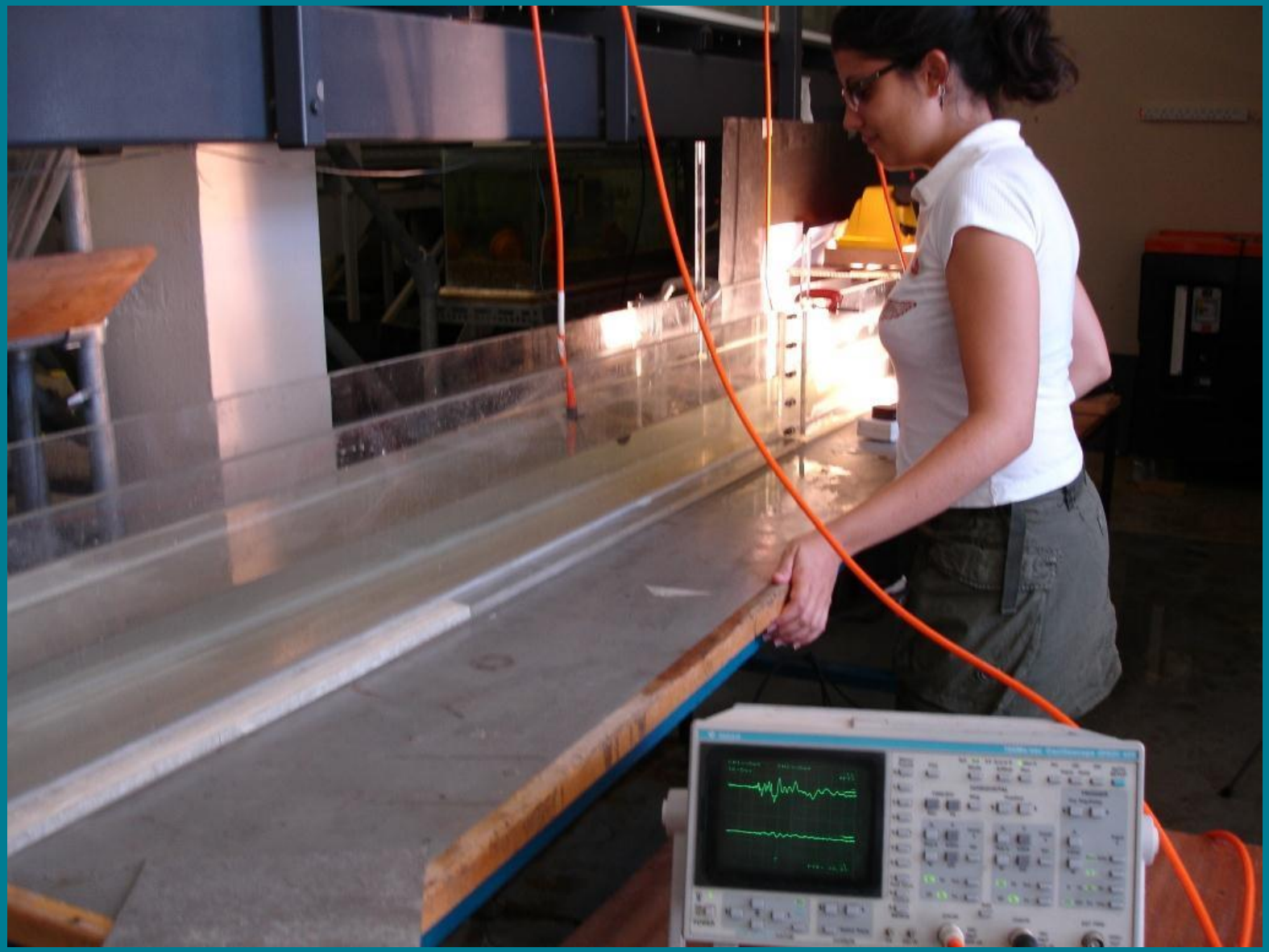

Smaller-scale tilting flume experiments

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Chilworth

At Chilworth Science Park, approx 8 km from the main Campus, we have an additional facility with

- a 25 m long, 1.4 m wide and 0.6 m deep indoor tilting flume
- a 60 m long outdoor flume with a trapezoidal cross section of 2.1 m width at the base, and 0.5 m depth, max flow 0.8 $m^3 s^{-1}$
- A 60 m x 0.5 x 0.5 m prismatic channel, max flow 0.15 $m^3 s^{-1}$

Large-scale tilting flume

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Large-scale tilting flume

Outdoor flume

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Above: 60 m channel with natural vegetation and sediment trap

Left: Outdoor flume experiment

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Outdoor flume experiment

Prismatic channel

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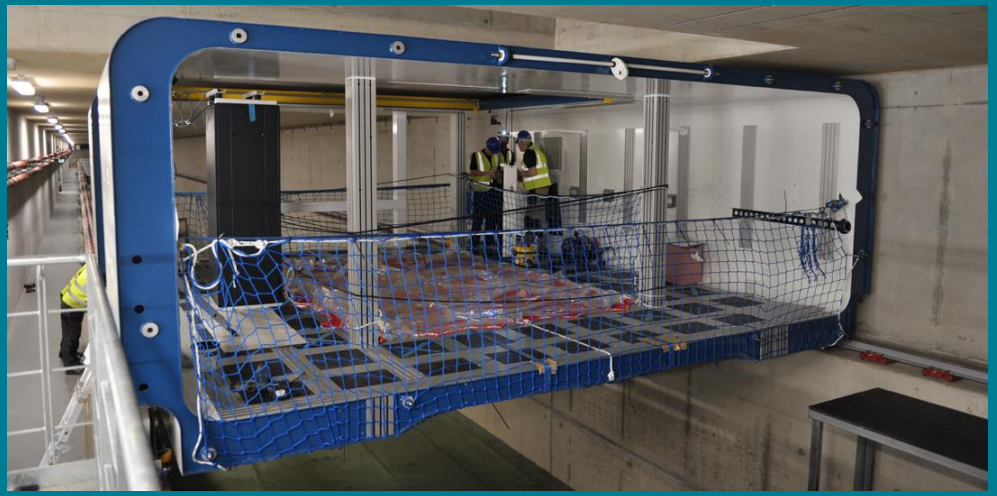
Boldrewood

Our new Hydromechanics building on the Boldrewood campus will house a range of large facilities designed for mixed mode teaching and research.

The towing tank (138 m long x 6 m wide x 3.5 m deep) is equipped with a high-speed carriage and multi-element wave maker: it is the first new tank to be built in the UK for several decades, and the largest university-owned one.

A tilting sediment flume with a working section 0.6 m wide and 16 m long is being installed to complement the facilities at Chilworth. A second water tunnel will be constructed for higher speed flows.

An additional flume coupled with a wind tunnel will also be installed.



Towing tank

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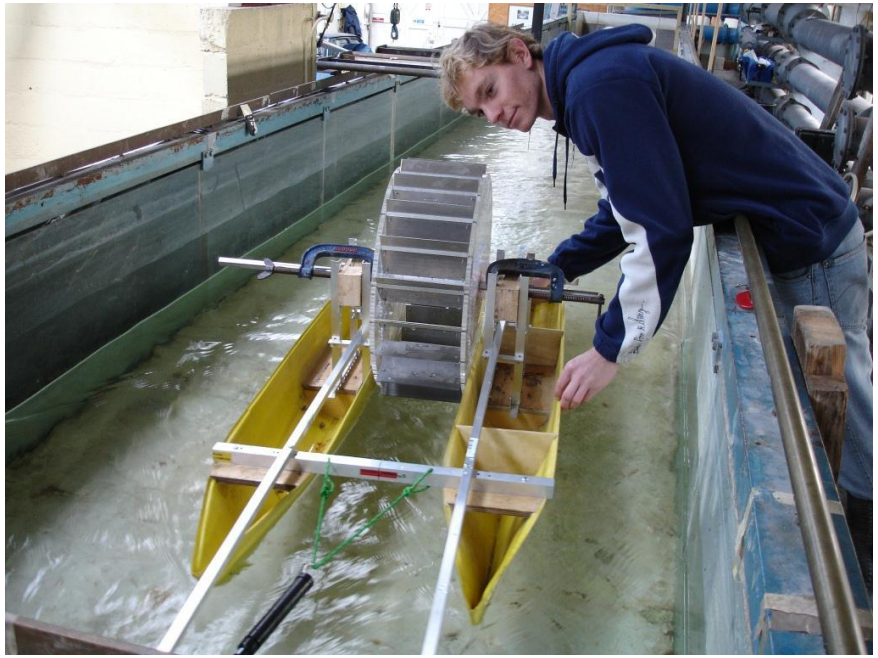
Teaching

We have 12 Armfield hydraulics benches on which we run the following experiments in Part 1:

- Cavitation demonstration
- Osborne Reynolds' experiment
- Hydrostatic force
- Conservation of Energy (Bernoulli theorem applied to a venturi section)
- Conservation of momentum (water jet impact)

Some examples of experimental work



Renewable Energy generation from low-head hydropower.

Above: Floating water wheel

Right: Hydrostatic pressure wheel

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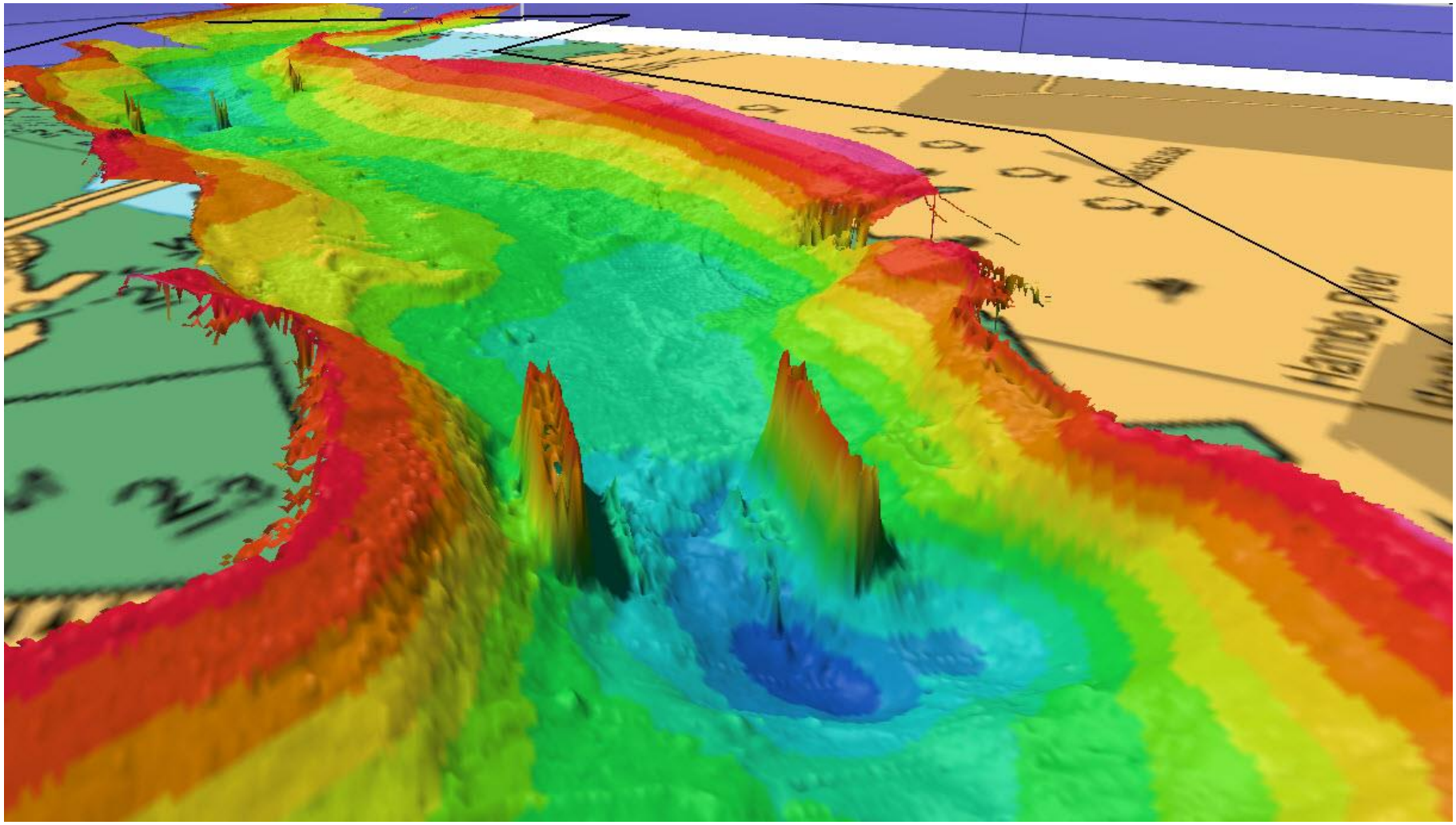
Wave-induced bed-forms and scour



Multi-beam sonar measurements of River Hamble bathymetry (Hampshire, UK)

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Remodelling the hydraulics of the Oakley Beat on the River Test

Experimental raceways in Almeria, Spain

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Experimental hydropower Installation

River Iskar, Bulgaria

Power = 10 kW
Head difference = 1.2 m

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More information

See also our webpages:

www.water-engineering.soton.ac.uk

www.facebook.com/Hydraulicslaboratory

www.southampton.ac.uk/engineering/research/themes/water_and_environment.page