Creating Safer Coastal and Port Infrastructure with Innovative Physical and Numerical Modelling

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• Physical and Numerical modelling
  • Breakwater Monitoring
    • Armour track
  • Vessel manoeuvring simulations for safe port design and operations
    • Simflex software – bringing vessels in and out of ports (Force Technology)
    • Dmax – Maximum underkeel clearance of vessels
    • Keoship software
    • Keofloat software
    • Wavescat
    • Passcat
    • Quaysim
    • Harbour watch
  • Wave current and environmental monitoring
    • IPOSS – Integrated Port Operations Support System
    • Virtual Buoy
Armour Track
Armour track using 3D data points
Ship manoeuvring simulations:
Ship Manoeuvring simulations

Port of Ngqura simflex simulator bridge View

identifying solutions and alternatives to difficult manoeuvres
Designing of ports and training of pilots
Long waves and moored vessels

- Ship motion monitoring of multiple ships at berth to optimize port layouts and mooring configurations
- Assess wave induced motions of free-running ships using our fleet of model ships and in-house software
Measuring long waves: Keofloat and Keoship systems

Keofloats used to measure very small waves

Keoship camera system viewing a vessel docked along a jetty
Numerical models for ship motion: WAVESCAT, PASSCAT & QUAYSIM

WAVESCAT
- Computes wave and hydrodynamic forces
- Boundary-integral equation model (BIEM)

PASSCAT
- Computes forces due to passing ship

QUAYSIM
- Time domain ship motion simulation model
- Computes ship motions and mooring forces due to waves, current and wind

QUAYSIM model setup with mooring lines and fenders
Calculating the maximum allowable safe draught: DMAX

Typical images generated by the DMAX model
Monitoring Nearshore Conditions: IPOSS and Virtual Buoy

Image of virtual buoy for Table Bay

General Wavenet site [http://wavenet.csir.co.za/](http://wavenet.csir.co.za/)
Numerical Modelling
Mike 21 Boussinesq wave and flow

Port of East London Mike 21 BW Model Outputs
Numerical Modelling
Delft 3D-SWAN

Proposed Durban Dig Out Port
Long Waves Studies
Numerical Modelling
Mike 21 Boussinesq Wave (BW)

Durban DigOut Port Layout

Mike 21 BW Model Outputs
Thank you