

THE NEWSLETTER OF THE CENTRE FOR MARINE SCIENCE & TECHNOLOGY

Welcome to the CMST Newsletter.

I hope that you will find the information about our research and consultancy programs of interest.

Andrew Woods, Director CMST.

Seeing in Depth at Depth

Earlier this year CMST completed development of a pair of underwater stereoscopic video cameras for Canadian company Welaptega Marine Ltd. The compact design (10cm diameter x 24cm) and a new depth rating of 4000m mean that the cameras are very versatile. Soon after delivery, the cameras were used for ROV intervention by *Shell / Todd* in New Zealand, *Sonsub UK* in the Central North Sea, and *BP UK / Subsea7* at a field north-west of Scotland. ROV operators really felt that the system was the answer to increasingly difficult and complex manipulator tasks.



The response to the cameras has been so good we are currently negotiating the manufacture of another batch of systems.

The new compact stereoscopic video cameras (front and right) with other CMST stereoscopic cameras.

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Coastal Success

Coastal research is set for a large boost following the success in gaining funding for a research program in Coastal

Water Habitat Mapping. The project started on 1st July and is part of the Brisbane-based Cooperative Research Centre for Coastal Zone, Estuary and Waterway Management. The program has a total budget of nearly \$10M.

CMST's Emeritus Professor John Penrose leads the new project and Dr Rob McCauley is managing one of the four sub-projects, Shallow Water Assessment Technologies. The project team has just taken delivery of a state-of-the-art shallow water acoustic swath mapping system which will be used for habitat mapping in locations including WA's Cockburn Sound and Recherche Archipelago.

Project partners include UWA, DSTO, Geoscience Australia, Fugro Survey, and Reson.

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Marine Acoustics and Hydrodynamics Skills

Professor Alexander Gavrilov

Alexander (Sasha) Gavrilov commenced with CMST as Professor of Marine Acoustics in January this year. Sasha has an extensive background in theoretical and experimental ocean and arctic acoustics including low frequency sound propagation, bottom-interacting acoustics, acoustic tomography of ocean environments and sea floor sediments, ice scattering, acoustic thermometry, signal processing, and design of acoustic receiving arrays. Sasha has held a number of senior positions, most recently as Senior Scientist with the PP



Shirshov Institute of Oceanology in Moscow, and has played principal roles in international programs including joint US-Russian initiatives in acoustic thermometry of the Arctic Ocean.

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Dr Tim Gourlay

Dr Tim Gourlay joined CMST as Hydrodynamics Research Fellow in December 2002. Tim's background is in mathematics and hydrodynamics and his main research and consulting activities are in seakeeping

and resistance of ships, underkeel clearance, yacht technology, and fluid dynamics.

Between international sailing adventures, Tim has worked on a diversity of projects including dynamic vessel stability in waves, bores produced by high-speed vessels in channels, deck-diving of catamaran ferries, and reducing cavitation on hull appendages.

Tim previously worked as a lecturer for two years with the Australian Maritime College in Launceston.

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Underwater Sound

CMST has had several marine acoustics field programs over the past months.

Air gun signals from **seismic surveys** operating in coastal waters between Dongara and Kalbarri were captured using the CMST sea noise recorders. These were analysed to determine their transmission in Western Australian coastal waters. Interestingly, in the shallow inshore water, the waterborne component of the air gun signals dropped away quickly leaving only sediment-borne low-frequency energy.

Several more deployments of the CMST sea noise recorders were carried out in the **Perth Canyon**. A grid of three recorders was deployed in ~450m of water on the Canyon edge from February to June 2003. Many blue whale signals were acquired with some records capturing up to 14 animals calling simultaneously. Work on the acoustic tracking of whales is progressing despite complications. These include multiple whale calls,

vessel and air gun signal noise (from a seismic survey being conducted over 400 km away), and a depth disparity in the hydrophones. Analysis suggests that the whales approach the Canyon from the south in a broad band, roughly bounded by the coast and the 500 m contour. They then appear to focus over the Canyon (where the hydrophones were) before fanning out again to the north. We are yet to determine whether the blue whales were attracted to our subsea equipment or that we had fortuitously selected the best location for them.

CMST also added to its growing list of recordings of **industrial noise** with the acquisition of acoustic signals from an underwater wellhead cutting operation using down-hole, jet-grit blasting. As expected, it was a noisy event. Modelling of the cutting noise propagation is currently underway.

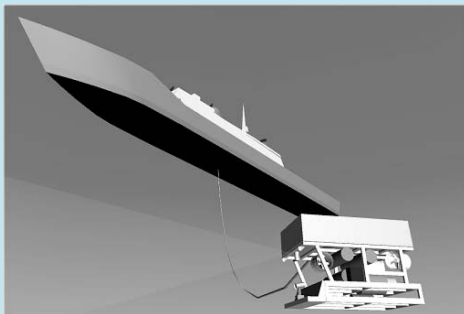
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Improved ROV Piloting

Remotely operated vehicles (ROVs) are commonly used to carry out underwater survey, inspection, maintenance, and repair tasks. This usage is increasing in offshore oil and gas exploration and production as operations move into deeper waters out of reach of direct human intervention. Similarly, the use of ROVs by the world's armed forces is also increasing, particularly for mine location and disposal. Research work being conducted by PhD candidate Peter Henley is aimed at increasing the operational effectiveness of ROVs by improving the

situational awareness of the pilots and their ability to navigate ROVs. Recent work has included the development of a virtual reality model of a Triton work class ROV which includes a detailed mathematical model of the ROV's umbilical.

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Vessel Motions

In April, ICON Engineering contracted CMST to supply a motions monitoring system for the float-over installation of the topsides to the West Patricia WP-PA jacket for Murphy Sarawak Oil in Malaysia. The 600 tonne platform was cantilevered off the bow of the transport vessel on a 6m deep truss with four hydraulic rams providing an additional 3.5m of lift during the installation. CMST developed software to ICON's specifications that, together with CMST's TSS 335B motion sensor, provided the operators with real-time motions data for the barge and the platform's stab cones during final approach and installation.



CMST's TSS 335B motion sensor



Platform installation using CMST motions measurement equipment. Image courtesy of ICON Engineering.

CMST regularly conducts full-scale trials of various vessel types using the TSS 335B motion sensor and other hardware to characterise seakeeping performance. CMST also provides related services including trials data analysis, interpretation and numerical modelling. CMST's suite of equipment is also available for use in other motion compensation applications.

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Vessel Stabilisation

CMST postgraduate student, Colin Ayres, won funding to present his paper on gyro-stabilisation of roll in small vessels at the 28th IMTA-Interferry Conference in Rotterdam, Holland, 22-25 September 2003.

Upcoming CMST Seminars

CMST holds regular seminars on marine science & technology topics - all welcome. CMST seminars are held at Curtin University, Physical Sciences Building 301, Room 147 and start at 12 noon. Bring your lunch - everybody else does.

ROLL MOTION OF YACHTS AT ANCHOR

Tuesday 2 Sep Kim Klaka, CMST

KRILL IN THE PERTH CANYON

Tuesday 16 Sep Chris van Etten, CMST

BLUE WHALES IN THE PERTH CANYON

Tuesday 23 Sep Rob McCauley, CMST

ACOUSTIC SIGNAL PROCESSING USING WAVELETS

Wednesday 8 Oct Professor Jo Ward, Dean of Science, Curtin

SQUAT OF A SHIP IN SHALLOW WATER

Tuesday 14 Oct Tim Gourlay, CMST

COGNITIVE WORK ANALYSIS AND ROV PILOTING INTERFACE DESIGN

Tuesday 21 Oct Peter Henley, CMST

FIELD USE OF STEREOSCOPIC VIDEO CAMERAS

Tuesday 11 Nov Andrew Woods, CMST

If you would like to receive email updates regarding CMST seminars, simply send an email to [<seminars@cmst.curtin.edu.au>](mailto:seminars@cmst.curtin.edu.au) to join our mailing list.