

AdChoices 

Audible Audio Books

14-Day Free Trial. No Obligation. Over 50,000 titles. Download Today! audible.co.uk

Need Survey Supplies

SCCS Your Measuring Partner Get Survey Equipment Online Today www.sccssurvey.co.uk

GCSE Biology

Home Study Guides & Support Specialised 13-18yrs Education www.OxfordHomeSchooling...

Sound Velocity Sensors

Correction for acoustic systems High accuracy, swappable sensors www.AMLoceanographic.com

FW Fencing Ltd

All types of Fencing, Free Quotes. Friendly Reliable Service Hampshire www.fwfencingltd.co.uk

TWIPS — sonar inspired by dolphins

NOVEMBER 17, 2010

Radiology Reporting

UK leaders in teleradiology and ultrasound www.4whc.com

Part E Acoustic Testing

Instant Acoustic Testing results on site! NHBC Technicians Nationwide www.nhbc.co.uk/acoustictesting

Surveying Instruments

Full Range Of Surveying Instruments Cheapest Rates Guaranteed | Buy Now SurveyingInstrument.MerlinLazer.com



AdChoices 

Scientists at the University of Southampton have developed a new kind of underwater sonar device that can detect objects through bubble clouds that would effectively blind standard sonar.

Just as ultrasound is used in medical imaging, conventional sonar ‘sees’ with sound. It uses differences between emitted sound pulses and their echoes to detect and identify targets. These include submerged structures such as reefs and wrecks, and objects, including submarines and fish shoals.

However, standard sonar does not cope well with bubble clouds resulting from breaking waves or other causes, which scatter sound and clutter the sonar image.

Professor Timothy Leighton of the University of Southampton’s Institute of Sound and Vibration Research (ISVR), who led the research, explained:

“Cold War sonar was developed mainly for use in deep water where bubbles are not much of a problem, but many of today’s applications involve shallow waters. Better detection and classification of targets in bubbly waters are key goals of shallow-water sonar.”

Leighton and his colleagues have developed a new sonar concept called twin inverted pulse sonar (TWIPS). TWIPS exploits the way that bubbles pulsate in sound fields, which

Google™ Custom Search

COMMENTS POPULAR LATEST

Smile « P.U.L.S.E.: [...] Smiles are contagious: It’s not just a say...

ssalt: this iz meh science fair pro thx for dah info :))...

Kim R.: Autism research is crucial to helping those in the...

Tom Hennessy: "Fish oil supplements increase requirements for V...

vikings direct: A very informative site to visit. I enjoyed this a...



- Environmental Blogads Hive**
- [Rainforest plant evolved beacon for pollinating bats](#)
 -
 - [Too Old to Learn New Plants?](#)
 -
 - [My XXL... something :\) :: Flower Gardening](#)
 -
 - [Mountain Hardwear's Snipona Jacket Wins](#)
 - [Read more...](#)
 - [Buy a Blogad!](#)

blog advertising is good for you

affects the characteristics of sonar echoes.

“To catch prey, some dolphins make bubble nets in which the best man-made sonar would not work. It occurred to me that either dolphins were blinding their sonar when making such nets, or else they have a better sonar system. There were no recordings of the type of sonar that dolphins use in bubble nets, so instead of producing a bio-inspired sonar by copying dolphin signals, I sat down and worked out what pulse I would use if I were a dolphin,” said Leighton.

As its name suggests, TWIPS uses trains of twinned pairs of sound pulses. The first pulse of each pair has a waveform that is an inverted replica of that of its twin. The first pulse is emitted a fraction of a second before its inverted twin.

Leighton’s team first showed theoretically that TWIPS might be able to enhance scatter from the target while simultaneously suppressing clutter from bubbles. In principle, it could therefore be used to distinguish echoes from bubble clouds and objects that would otherwise remain hidden.

In their latest study, the researchers set out to see whether TWIPS would work in practice. Using a large testing tank, they showed experimentally that TWIPS outperformed standard sonar at detecting a small steel disc under bubbly conditions resembling those found under oceanic breaking waves.



Encouraged by their findings, they next conducted trials at sea aboard the University of Southampton’s coastal research vessel the RV Bill Conway. They compared the ability of TWIPS and standard sonar to discern the seabed in Southampton Water, which handles seven per cent of the UK’s entire seaborne trade. The seabed in this area varies in depth between 10 and 20 metres.

“TWIPS outperformed standard sonar in the wake of large vessels such as passenger ferries,” said co-author Dr Justin Dix of the University of Southampton’s School of Ocean and Earth Science (SOES) based at the National Oceanography Centre, Southampton.

Possible future marine applications for TWIPS include harbour protection and the detection of bubbles in marine sediments and manufacturing. Technologies based on the same basic principles could be used in medical ultrasound imaging, which was already using pairs of inverted pulses to

FROM OUR BLOGGERS

- [I miss my dog](#)

We got her about twelve years ago, as a little...

- [Lab-profile: prof. dr. Maurice van Steensel – University Hospital Maastricht](#)

In this month’s lab-profile we introduce Professor Maurice van Steensel,...

- [Communication in the depths: perhaps not as primitive as we would like to think – Coleoid communication.](#)

Have you ever wondered how animals communicate? Some animals have...

- [Doctor/Patient Communication Key in Fight Against Unnecessary Antibiotic Prescription](#)

Patient satisfaction is essential to doctors in all settings and...

- [Conference reports](#)

In July, the Beatson International Cancer Conference took place at...



enhance (rather than suppress) contrast agents injected into the body. The TWIPS principle would work with other sensors such as in Magnetic resonance imaging (MRI), and Leighton has proposed TWIPR (Twin Inverted Pulse Radar) for the detection of improvised explosive devices or covert circuitry.

But what about the original inspiration for the research — do dolphins and other echolocating animals use TWIPS?

“Key ingredients of a TWIPS system appear in separate species but they have never been found all together in a single species,” said Leighton. “There is currently no evidence that dolphins use TWIPS processing, although no-one has yet taken recordings of the signals from animals hunting with bubble nets in the wild. How they successfully detect prey in bubbly water remains a mystery that we are working to solve. I have to pay credit to the team — students Daniel Finfer and Gim-Hwa Chua of ISVR, and Paul White (ISVR) and Justin Dix of SOES. Our applications for funding this work were repeatedly turned down, and it took real grit and determination to keep going for the five years it took us to get this far.”

The paper describing study is based on the RWB Stephens Medal address that Leighton gave last year, when he was awarded the 2009 RWB Stephens Medal of the Institute of Acoustics.

Publication:

Leighton, T. G., Finfer, D. C., White, P. R., Chua, G.-H. & Dix J. K. Clutter suppression and classification using twin inverted pulse sonar (TWIPS). *Proc. R. Soc. A* 466, 3453 (2010).



[WASSP Multibeam Sonar](#)

Affordable Swath Bathymetry Is Here - 112 beams - 160 kHz - GBP 19200.

www.oceanDTM.com

[Hydrographic Survey Tool](#)

Small AUV, Operate from shore Low cost, easy to use, accurate

www.iver-auv.com

[Underwater Video Cameras](#)

Built in the USA - High Quality Available Factory Direct

www.splashcam.com



AdChoices

About admin

[View all posts by admin →](#)

Hey you!

Let the world know that you read something cool on **Science Blog!** Or subscribe by entering your email below.



 [breaking waves](#), [bubble](#), [bubble clouds](#), [ISVR](#), [Sonar](#), [sonar echoes](#), [sound pulses](#), [university of southampton](#), [vibration research](#)

← [The pericyte becomes a player in Alzheimer's, other diseases](#)

[Faster water flow means greater diversity of invertebrate marine life](#) →

No comments yet.

Leave a Reply

Name (required)

Email (will not be published) (required)



CAPTCHA Code *