



## *E-NEWSLETTERS*

*June 2014 ISSUE*

# **THE SOCIETY OF ACOUSTICS SINGAPORE**

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Registration No: 0331/1989  
Year of Registration: 1989

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## I CONFERENCE NEWS

Fellow members of the Society may like to take note of the following:

### **21<sup>st</sup> International Congress on Sound and Vibration(ICSV21)**

Date: 13-17 July 2014

Venue: Beijing,China

Deadline for Early [Registration](#) : **15 March 2014**

#### **For Non Peer Reviewed Papers:**

Abstract Deadline : **31<sup>st</sup> January 2014**

Notification of Acceptance of Abstracts : **15 February 2014**

Deadline of Full-Length Submission : **15 March 2014**

#### **For Peer Reviewed Papers:**

Abstract Deadline : **1 December 2013**

Notification of Acceptance of Abstracts : **31 December 2013**

Deadline of Full-Length Submission : **31 January 2014**

For more information, please visit: [www.icsv21.org](http://www.icsv21.org)

**Please note that Woon Siong Gan will be organising three structured sessions for ICSV21 on:(i)Nonlinear acoustics and vibration, (ii)New acoustics, based on metamaterials, and (3)Application of Metamaterials to Sound Insulation and Noise Cancellation The closing dates for the 300 words abstracts is 1<sup>st</sup> March 2014. Kindly send abstracts directly to: [wsgan@metaultrasound.com](mailto:wsgan@metaultrasound.com) or to [www.icsv21.org](http://www.icsv21.org).**

## Western Pacific Acoustics Conference (WESPAC)

Date: 6-10 December 2015  
 Venue: Grand Copthorne Waterfront  
 Organiser: Society of Acoustics(Singapore)

### Key Dates

- ☐ 1 Dec 2014 – Call for papers
- ☐ 1 April 2015 – Proposal for Structural Session\*\*
- ☐ 1 May 2015 – First abstract deadline
- ☐ 1 July 2015 – Last extension deadline for abstract
- ☐ 15 July 2015 – Notification of acceptance / Online registration opens
- ☐ 15 Aug 2015 – Early bird deadline closes
- ☐ 15 Oct 2015 – Deadline for authors to register
- ☐ 1 Dec 2015 – Online registration closes\*\*

### Delegate Fees – UPDATED

Type of Payment	Early Bird (before 15 Aug 2015)	Normal (before 1 Dec 2015)	On Site (from 6Dec2015)
Full registration fee (member (IIAV, ASA, ASJ, etc)	SGD900	SGD1,000	SGD1,200
Full registration fee (non- member)	SGD990	SGD1,090	SGD1,200
Student	SGD450	SGD550	SGD650
Extra Paper	SGD150	SGD150	NA
Extra Banquet Ticket	SGD150	SGD150	SGD250
Extra for Welcome Reception	SGD50	SGD50	SGD80

Website will be announced soon. Please send enquiries to: [wsgan@metaultrasound.com](mailto:wsgan@metaultrasound.com)

## II. ANNOUNCEMENTS

The Society of Acoustics will be sending out invoices to members with outstanding membership subscriptions. Members are encouraged to make payment in support of the Society.

The E-Newsletters will be made available to industrial contacts in an effort to promote the activities of the Society.

The Society is also exploring the possibility of organising talks and other professional events in collaboration with acoustic societies of other countries.

Membership Certificates will soon be made available to all members who had made full payments of membership dues

The Society aims to increase membership by inviting all persons, including those from the institution of higher learning and other related societies such as the Institute of Architects, Singapore and the members of the mechanical engineering division of the Institution of Engineers, Singapore who are qualified in the various field of Acoustics to join our Society.

**We are especially keen to invite students to join our society and we are establishing the Youth Chapter soon.**

## III. MEMBERSHIP SUBSCRIPTION

Fellow	S\$70
Member	S\$50
Associate	S\$30
Student	S\$15
Corporate	S\$200

### FEE BASED ON ANNUAL RATE

FOR MORE INFORMATION PLEASE CONTACT: Dr.Gan at  
email: [wsgan@metaultrasound.com](mailto:wsgan@metaultrasound.com)

Application form: ( ) Member ( ) Associate

1) Name: \_\_\_\_\_

2) Address: \_\_\_\_\_

Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_

3) Degrees (Institutions and dates):  
\_\_\_\_\_

4) Employment (with dates):  
\_\_\_\_\_

5) Signature & Date: \_\_\_\_\_

## IV

## NEW BOOK ON ACOUSTICS AND VIBRATION

### **Acoustical Imaging: Techniques & Applications for Engineers**

**by Woon Siong Gan**

**Hardback | 440 pages | June 2012 | ISBN 978-0-470-66160-4**

**£85.00 | €98.80 | \$140.00**

**John Wiley & Sons**

The technology of acoustical imaging has advanced rapidly over the last sixty years, and now represents a sophisticated technique applied to a wide range of fields including non-destructive testing, medical imaging, underwater imaging and SONAR, and geophysical exploration. Acoustical Imaging: Techniques and Applications for Engineers introduces the basic physics of acoustics and acoustical imaging, before progressing to more advanced topics such as 3D and 4D

imaging, elasticity theory, gauge invariance property of acoustic equation of motion and acoustic metamaterials. The author draws together the different technologies in sonar, seismic and ultrasound imaging, highlighting the similarities between topic areas and their common underlying theory.

Key features:

- ◆ Comprehensively covers all of the important applications of acoustical imaging.
- ◆ Introduces the gauge invariance property of acoustic equation of motion, and symmetry properties of acoustic fields with applications in the elastic constants of isotropic solids, time reversal acoustics, negative refraction, double negative acoustical metamaterial and acoustical cloaking.
- ◆ Contains up to date treatments on latest theories of sound propagation in random media, including statistical treatment and chaos theory.
- ◆ Includes a chapter devoted to new acoustics based on metamaterials, a field founded by the author, including a new theory of elasticity and new theory of sound propagation in solids and fluids and tremendous potential in several novel applications. Covers the hot topics on acoustical imaging including time reversal acoustics, negative refraction and acoustical cloaking.

Acoustical Imaging: Techniques and Applications for Engineers is a comprehensive reference on acoustical imaging and forms a valuable resource for engineers, researchers, senior undergraduate and graduate students

## V. ARTICLE

### A Metamaterial Route to High Temperature Superconductivity

by Woon Siong Gan

**This is classified under the field of quantum metamaterials because in superconductor we are concerned with steering electrons which are quantum-sized particles.**

Sonic crystals have the capability to steer sound waves. Depending on length scales, the microscopic ones are known as phononic crystals and the macroscopic ones the metamaterials. They are made of repeating 3 D patterns of electronic components such as capacitors and resistors. The mathematics of steering the directions is known as coordinates transformation or gauge invariance if we go to the fundamental level. These are the same equations used in general relativity where mass warps spacetime to generate gravity. That is why physicists have been able to use a metamaterial to simulate the way that a black hole traps light.

Now Igor Smolyaninov and Smolyaninova from the University of Maryland in College Park, proposed that metamaterials may be formally linked to superconductivity. They say that superconductors may be a special form of metamaterial that steer electrons instead of light or sound. That raises the possibility that the key to the secret of high temperature superconductivity could lie in the development of a new generation of metamaterials that exploit the idea further.

Superconductivity is the phenomenon of zero resistance in materials cooled below some critical temperature and expel magnetic fields. It is explained by the BCS theory which states that at low temperatures electrons double up to form Cooper pairs which travel through the material lattice together. They do this with zero resistance by exchanging phonons –quantum quasi particles of vibration-with the lattice. In effect, the Cooper pairs are swept through the lattice by these phonons which clear the way of obstructions such as other electrons. That is why there is zero resistance. This shows that superconductor has the ability to steer electrons. Indeed, Smolyaninov and Smolyaninova say that high temperature superconductors such as BSCCOs (bismuth strontium calcium copper oxides) which superconduct at over 100K have a formal similarity with the metamaterials that physicists have already built to steer light. This is because they consist of layers of atoms with metallic properties interspaced with layers of atoms that have dielectric properties. In effect they are the ultimate metamaterials constructed on the atomic scale.

That raises the fascinating prospect that physicists might one day engineer superconducting metamaterials of their own. And with a better understanding of exactly how these layers steer electrons with zero resistance, it even be possible to

make materials that superconduct at higher temperatures that are possible today. They argued that the metamaterial approach to dielectric response engineering may considerably increase the critical temperature of a composite superconductor-dielectric metamaterial.

To fabricate artificially a room temperature superconductor with metamaterial, the first step would be to design a superconducting metamaterial and predict its superconducting properties. After that would come the significant challenge of synthesising it. The science of metamaterial has evolved significantly during the last ten years, from invisibility cloak to artificial black holes and even synthetic universes.

## **VI. GOVERNMENT NEWS**

The National Environmental Agency (NEA) has announced on 20 Feb 2014 a S\$10 million Quieter Construction Fund (QCF) to help construction companies. This is to subsidise their costs to purchase building materials to reduce construction noise, to purchase noise measurement equipment and the investment in the introduction of new building methods. Through the QCF, companies will be reimbursed for up to half the cost of purchasing or leasing noise-limiting equipment. This fund will be available for application starting from 1<sup>st</sup> April 2014 and will be for a two years trial period. The size of each application is capped at a hundred thousand Singapore dollars or 5% of the construction contract value whichever is the lower. This fund is available for the purchase or lease of noise control material or equipment. Each unit of equipment must be of minimum value 5000 Singapore dollars. If it is for a creative construction method to reduce noise then NEA can also part of the design, assembly and demolition costs. The fund can also be used to help pay for noise barriers, which can cut noise pollution by about half. But noise-limiting technology comes at a price - and this is a challenge faced by construction firms. For instance, erecting high noise barriers around a construction site could cost more than S\$100,000.

The use of equipment producing less noise does not compromise productivity which is vital for the contractors. Quieter equipment does not mean it is slower. Some could in fact be faster. For instance, the jack-in piling machine. The 85 decibels it generates make it much quieter than the commonly used bore piling machine which produces 107 decibels, the equivalent of jet taking off around 300 m away. A 10 dB increase in decibel levels is perceived to be twice as loud.

This latest move by the NEA comes amid an increasing number of complaints about worksite noise. In 2009, NEA received about 13,000 complaints. This spiked to roughly 20,000 in 2012 before coming down to about 17,000 last year. Over the same five-year period, enforcement action taken by the agency against builders also grew from about 300 cases to 1,100, an increase of more than 260 per cent. Companies that violate noise limits face a fine of up to S\$40,000.

## VII. VISIT TO ACOUSTIC RESEARCH LABORATORY, TROPICAL MARINE SCIENCE INSTITUTE, NUS

On 25 April 2014, Friday, the Society of Acoustics(Singapore) organised a visit to the Acoustic Research Laboratory, Tropical Marine Science Institute, NUS at 5pm. A group photo was taken and shown below.





## IX. USEFUL LINKS

### Bodies

[www.mom.gov.sg](http://www.mom.gov.sg)

[www.nea.gov.sg](http://www.nea.gov.sg)

### Technical and Research Sites

### Corporate Sites

[www.metaultrasound.com](http://www.metaultrasound.com)

[www.noisecontrols.com](http://www.noisecontrols.com)

(The Society welcomes interested parties to contribute relevant websites to the above e useful links. For more information, please contact us. Thank you.)

### Disclaimers

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