



## Short Course on October 7, 2012

Title: **Array Imaging and Defect Characterisation: Engineering Applications**

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### **Course Description**

The use of post-processing techniques for array imaging applications in engineering has increased rapidly over recent years. This course surveys the current possibilities in ultrasonic array post-processing and discusses their usefulness for typical engineering applications such as non-destructive evaluation. Future directions for array imaging are also described. A combination of increased computational power and reduced cost of electronic components means that it is now possible to extract the full time domain data set for every transmit-receive combination at every location during an inspection. The consequence of this is that a wide range of post-processing imaging methods are now possible in near real time. Early work in this field used imaging methods developed for medical applications. However, more recently it has become evident that engineering applications offer distinctly different challenges such as the presence of multiple modes and the need to extract precise information about each scatterer. Throughout this course, links are made between medical and engineering applications and, where appropriate, differences highlighted.

**Bruce Drinkwater** was born in Hexham, England in 1970. He received BEng and Ph.D. degrees in Mechanical Engineering from Imperial College, London, England in 1991 and 1995, respectively. His Ph.D. thesis was on the subject of dry coupled ultrasonic devices for non-destructive evaluation. From 1996 to the present he worked as an academic in the Mechanical Engineering Department at the University of Bristol, England. During this time he has published over 70 journal articles on a range of topics connected with ultrasonics and non-destructive evaluation. In 2000 he was awarded a 5-year EPSRC Advanced Research Fellowship to study ultrasonic wheel probes and the ultrasonic measurement of adhesive joints, thin layers and interfaces. During this period both his work on array-wheel probes and on bearing condition monitoring was commercialised. He was promoted to Professor of Ultrasonics in 2007. In 2009 he received the Roy Sharpe Prize for his significant contribution to research in ultrasonic NDE. He is a Fellow of the British Institute of Non-Destructive Testing.

**Paul D. Wilcox** was born in Nottingham, England in 1971. He received an MEng degree in Engineering Science from the University of Oxford, England in 1994 and a Ph.D. from Imperial College, London, England in 1998. From 1998 to 2002 he was a Research Associate in the non-destructive testing research group at Imperial College where he worked on the development of guided wave array transducers for large area inspection. From 2000 to 2002 he also acted as a Consultant to Guided Ultrasonics Ltd., Nottingham, England a manufacturer of guided wave test equipment. In 2002 he was appointed to a lecturing post at the University of Bristol, England where he was subsequently promoted to Professor in 2010. In 2007 he was awarded a 5-year EPSRC Advanced Research Fellowship to study guided wave structural health monitoring. His current research interests include long-range guided wave inspection, structural health monitoring, array transducers, elastodynamic scattering and signal processing. He has published over 60 journal articles and is a member of the Institute of Physics.

**Alexander Velichko** was born in Krasnodar, Russia in 1975. He received an M.Sc. degree in applied mathematics from the Kuban State University, Krasnodar, Russia in 1998 and a Ph.D. degree from the Rostov State University, Rostov-on-Don, Russia in 2002. His doctoral research was on the investigation of wave fields caused by internal vibration sources in layered elastic medium. He is currently researching ultrasonic arrays for non-destructive evaluation in the Department of Mechanical Engineering at the University of Bristol, England. His current research interests include mathematical modeling of propagation and scattering of elastic waves, ultrasonic imaging using arrays, and guided waves and signal processing.

Conference website: [http://ewh.ieee.org/conf/ius\\_2012](http://ewh.ieee.org/conf/ius_2012)

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