

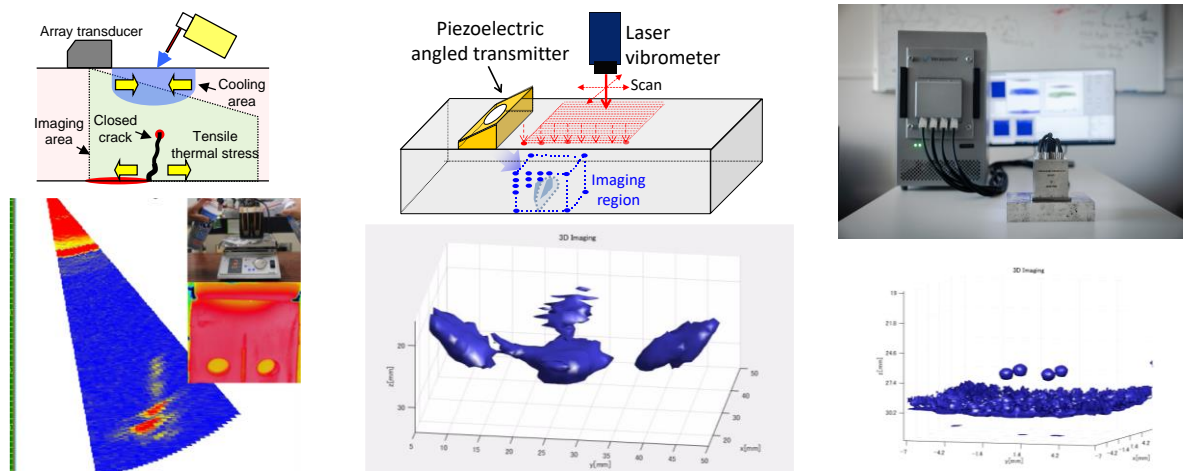
Winter
2025

Optics & Photonics Group Lunchtime Seminar Series

University of Nottingham

Frontiers of ultrasonic phased array for accurate crack imaging

Prof Yoshikazu Ohara
Tohoku University



12:00 Tue. 18 March 2025

Pope Building – A17



Yoshikazu
Ohara

Frontiers of ultrasonic phased array for accurate crack imaging

Cracks are one of the severe defects that can drastically decrease the material strength of structures and mechanical components. Ultrasonic testing is (UT) the most widely used technique for non-destructive detection and sizing of cracks. However, UT faces challenges with crack closure and 3D visualization. Crack closure can lead to the underestimation of crack depth, as ultrasound waves can transmit through the crack. To address this issue, we have developed closed-crack imaging methods using a nonlinear ultrasonic phased array (nonlinear ultrasonic PA). This technique has successfully measured closed-crack depth in various metallic specimens. On the other hand, currently, the nonlinear ultrasonic PA is limited to 2D imaging due to the use of a 1D array transducer, while real-world defects often have complex 3D geometries. The primary limitation has been the insufficient number of elements for an array transducer. To overcome this challenge, we are developing two types of ultrasonic 3D imaging systems. The first is a Piezoelectric and Laser Ultrasonic System (PLUS) for flexible 3D imaging. The second is a real-time 3D PA system using a piezoelectric 1024-element 2D matrix array transducer developed for non-destructive evaluation (NDE) applications. This seminar will introduce the nonlinear ultrasonic PA and two types of 3D PA imaging methods for accurate crack imaging.

12:00 Tue. 18 Mar 2025

Pope – A17

All are welcome



University of
Nottingham
UK | CHINA | MALAYSIA