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Full-field Imaging Vibrometry for Rapid Non-destructive Evaluation

James Kilpatrick, Adela Apostol, and Vladimir Markov, Advances Systems &Technologies (AS&T Inc.), Fiber Sensors and Systems Laboratory, Irvine CA 92618

NDE methods calling for spatially extended measurement of surface structural dynamics may be of limited practical application because measurement times are prohibitively slow for use under environmentally variable conditions. However, scanning single beam ultrasound and scanned single beam laser Doppler vibrometry (SLDV), remain as the foremost viable NDE sensor technologies developed over the past several decades.

This paper discusses new developments in sensor technology for Full-field Imaging Vibrometry at AS&T Inc. These sensors are capable of extended field measurement of structural dynamics at bandwidths extending from near DC to ultrasonic [1]. As compared to manual deployment of spatially distributed sensor arrays, such as embedded or surface fixed piezo ceramics, rapid capture of swept frequency broadband ultrasound data at hundreds of points simultaneously (Figure 1), employed with new analytical tools such as those developed by Prof. J.E Michaels of Georgia Institute of Technology [2], offer a major step towards practical field implementation of successful strategies for blind ultrasonic NDE for detection of multiple damage modalities. Designed for field application, the sensor technology described here is non-contact, requires no surface preparation, can be configured to conform to a variety of spatial configurations in support of different NDE strategies.

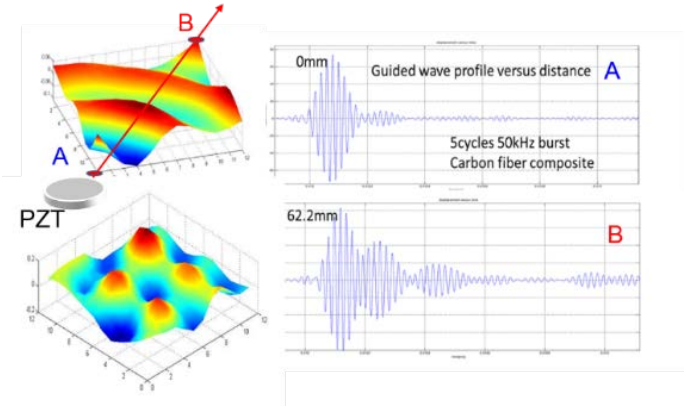

Figure 1. Selected frames from movie capture with prototype SCOVA. Injected signal is a 5 cycle 50 kHz tone burst in carbon fiber composite.

Acknowledgements:

The authors are grateful to NASA Langely for their ongoing support of these developments (contract no: NNX15CL26C).

References:

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