Adaptive Intelligent Materials and Systems Center

Ira A. Fulton Schools of Engineering, ASU cordially invites you to attend a seminar presented by

Dr. Mark Seaver
Consultant to NRL & ONR

“Lambwave Changes Due to Multiple Damage Sites”

Wednesday, April 13, 2016 at 8:30 AM in ERC 490

Abstract: The US Navy is interested in fiber optic based damage detection in a variety of its assets, particularly aircraft and ships. One possible damage detection scenario is to detect and monitor rivet hole cracks in the spar caps of aircraft wings using ultrasonic signals. The experiments described today represent a laboratory investigation into what Lamb wave signals look like and how they change as a series of holes are drilled into a flat Aluminum panel and enlarged one by one. The Aluminum panel is 496mm x 647mm x 1mm. The pitch sensor is a 1 cm round by 2 mm thick PZT that is positioned 175 mm in and 179 mm up from the nearest edges. The catch sensors are a novel fiber laser that will be described briefly in the presentation and a miniature ultrasonic sensor (Physical Acoustics, S9225). The catch sensors are 447 mm in and 179 or 184 mm up from the same edges as the pitch sensor, for a pitch-catch distance of 272 mm. The initial damage detection efforts used 10 mm round by 2 mm thick dots of putty that could be easily stuck on the surface and removed. Subsequent measurement involved a series of 10 holes drilled in the plate 100 mm from the edge (79 mm from the pitch sensor) with their centers spaced 25.4 mm apart. For some measurements damping of reflected was added using strips of plumbers putty placed near the edges on the top and bottom of the plate.

Bio: Dr. Mark Seaver has been involved in the development of hardware and analysis methods for damage detection since 2000. During the years 2003 – 2008 he was the head of the Fiber Optics Smart Structures Section at the Naval Research Laboratory (NRL) where he lead both laboratory and field efforts into damage detection using fiber optic sensors and advanced statistical analyses. Since his retirement from the Navy, he has continued to investigate damage detection methods and sensors as a consultant for the Dr. Ignacio Perez of the Office of Naval Research (ONR) and Dr. Geoff Cranch, NRL through Sotera Defense Solutions.

Refreshments will be served