Y. OKABE LAB.

Health Diagnostic Systems for Mechanical Structures

Department of Mechanical and Biofunctional Systems
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Structural Health Diagnostics
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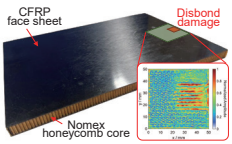
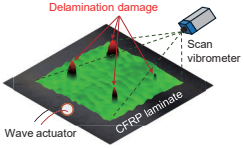
http://www.okabeylab.iis.u-tokyo.ac.jp/en/

Lightweight composite structures have been applied to airplanes and automobiles. For the health diagnostics of the structures, we are developing structural health monitoring systems with optical fiber ultrasonic sensors, non-destructive inspection techniques using laser ultrasonics, and carbon nanotube composite sensors. In addition, we are attempting to construct an inspection system applicable to extreme environments.

Structural Health Diagnostics with Guided Waves

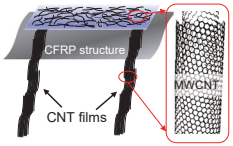


Damage detection in honeycomb sandwich structures using laser-excited ultrasonic guided waves



Delamination detection in a CFRP laminate based on guided wave-activated local defect resonance

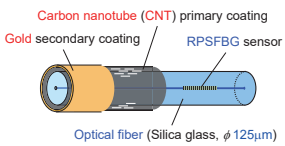
CNT Strain Sensor



Structural Strain monitoring with carbon nanotube (CNT) composite sensor

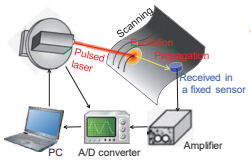
Non-destructive Inspection System Applicable to Extreme Environments

Optical Fiber Sensor (Ultrasonic Receiving)

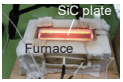


High heat-resistance optical fiber sensor with CNT-Au coating

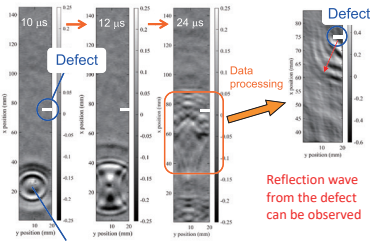
Laser Ultrasonics (Ultrasonic Excitaion)



Laser ultrasonic visualizing inspector
(LUVI-CP, Tsukuba Technology Co., Ltd.)



Ultrasonic inspection was conducted to a ceramic plate heated up to 1000 ℃



Reflection wave from the defect can be observed

Even at high temperature of 1000 ℃, ultrasonic propagation behaviors can be visualized, which enables the observation of reflection waves from defects