

# Y. OKABE LAB.



## Structural Health Diagnostic Systems

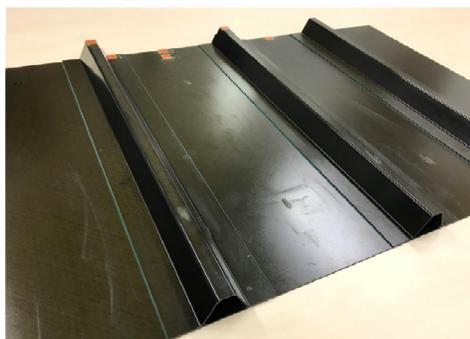
Department of Mechanical and Biofunctional Systems  
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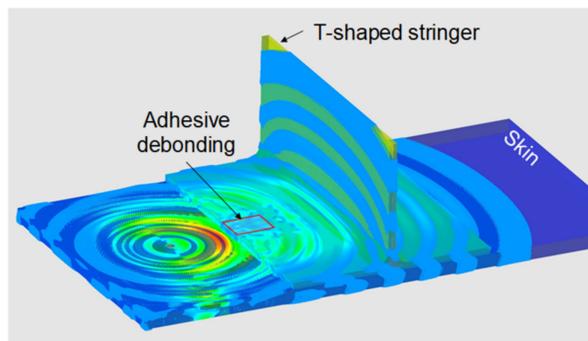
Lightweight composite structures have been applied to airplanes and automobiles. For the health diagnostics of the structures, we are developing structural health monitoring systems with optical fiber ultrasonic sensors and non-destructive inspection techniques using laser ultrasonics. In addition, we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

### Lightweight Composite Structures

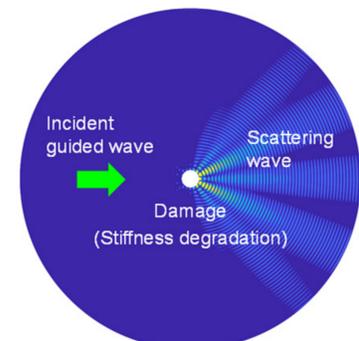


CFRP stiffened panel

### Structural Health Monitoring Using Guided Waves



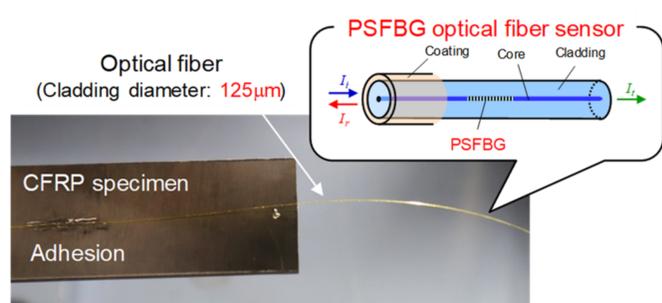
Detection of debonding damage in a CFRP skin/stringer bonded structure



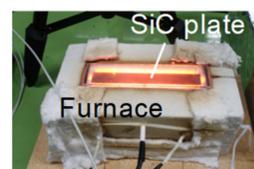
Calculation of scattering wave at an impact damage in CFRP based on thin plate theory

### Non-destructive Inspection System Applicable to Extreme Environments

#### Optical Fiber Sensor (Ultrasonic Receiving)

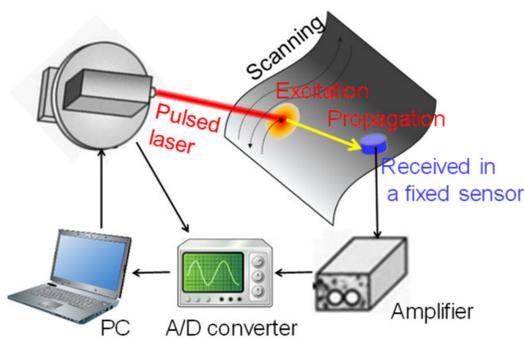


Optical fiber ultrasonic sensor achieving remote AE measurement

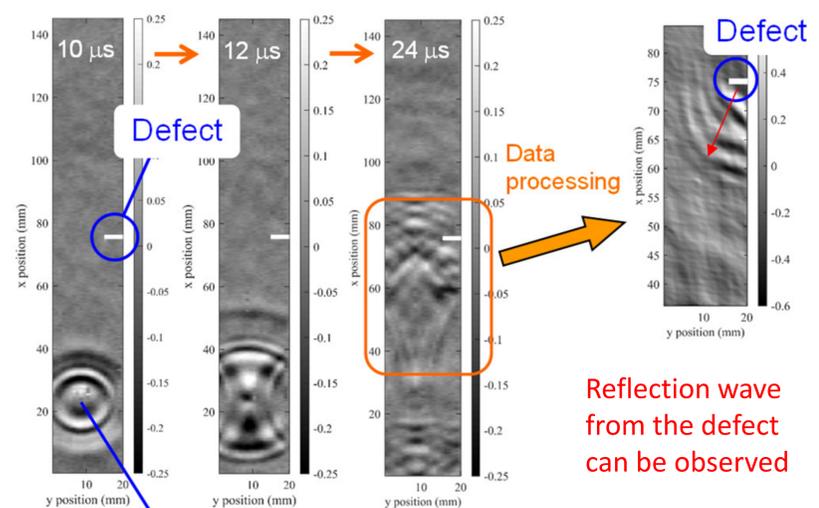


Ultrasonic inspection was conducted to a ceramic plate heated up to 1000 °C

#### Laser Ultrasonics (Ultrasonic Excitation)



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



Adhesion point of an optical fiber

Reflection wave from the defect can be observed

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