**OKABE, Y. LAB.**

**[Structural health monitoring and adaptive structures]**

Department of Mechanical and Biofunctional Systems

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Smart Material Systems

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**Damage detection system using ultrasonic waves and optical fiber sensors**

**Built-in broadband ultrasonic propagation system for detection of delamination damage**

Broadband ultrasonic waves are propagated with the devices integrated with the composite laminate, and the internal delamination damage are evaluated quantitatively based on the mode conversion behavior.

(Toward practical use of the system to aircraft et al., we investigates the correction method of environmental temperature effect.)

**Function enhancement of the system for passive detection of impact strain waves**

Impact load was applied to a CFRP laminate with an FBG sensor, and the impact strain wave was able to be obtained from multiple port outputs through the inverse calculation.

Collision of foreign objects that is the main cause of damage occurrence in CFRP composite structures can be detected passively.

**Smart adaptive structure systems with integrated shape memory materials**

Through the geometric investigation of SMA wires, we construct the artificial muscle with high stretch properties and moderate contractive force suitable for rehabilitation of joint in the finger.

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