

# **Non-contact imaging for damages in a plate-like structure**

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Plate-like structures such as pipes and building walls are used everywhere in a factory. Usually whole inspection of such plate-like structures would be a very laborious task, and efficient inspection techniques are strongly required to improve plant safety. This study describes imaging technique for damages in such plate-like structures with a remote measurement of elastic waves using a laser. Structure vibrations can be measured using a laser Doppler vibrometer at a distance like 10 meters. However, because the vibration measurement requires to detect scattering light from a surface of the object, stable measurements are not easy during the scan of a laser spot. On the other hand, generation of elastic waves is occurred by thermos-elastic effect of ablation using a laser, and therefore it can be easily feasible when a laser spot is sufficiently small compared with a wavelength. In the experiments, the generation laser was scanned over a plate-like structure and the detection laser was fixed at one position on a surface to measure a large number of waveforms stably. Using the waveforms, defect images were created by the use of the characteristic of flexural vibration in a low frequency range. To improve defect images, diffuse field concept was also introduced.