Please my presentation and Jun Shitaka's presentation be in sequence.
His member ID is 61260653.

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Evaluation of residual stress by measuring resonant frequency with Optical Method SHUHEI MIYAZAKI, SANICHIRO YOSHIDA, Southeastern Louisiana Univ, TOMOHIRO SASAKI, Niigata Univ — Residual stress in dissimilar welding is important for quality management. A number of techniques are available for residual stress analysis such as X-ray diffraction and hole-drilling methods. However, these methods are time-consuming. We propose to assess residual stress of dissimilar lap-welded plates from analysis of harmonic response of the specimen. We hypothesize that residual stresses alters the elastic modulus and hence shifts the resonant frequency. In this study, as the first step for the above approach, we used annealed and quenched cantilever specimens of the same material for a proof of the principle. We oscillated the cantilever by applying sinusoidal forced at the free end. By sweeping the driving frequency around theoretical resonant frequency, we observed resonant behaviors of the oscillation. We used optical interferometry to visualize the out-of-plane oscillation of the specimen. We develop a technique to use a digital camera whose frame rate is significantly lower than the driving frequency. As expected, the amplitude of specimen changed remarkably around the resonant frequency, and digital camera was able to detect this as fringe images. We were able to identify the resonant frequency.

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