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Elucidation of fatigue fracture behavior by using ESPI NAOYA FUJISHIMA, SANICHIRO YOSHIDA, Southeastern Louisiana University, TOMOHIRO SASAKI, Niigata University — The goal of this research is to elucidate the fatigue fracture mechanism via analysis of dynamic behaviors of displacement field. We use an optical interferometric technique known as Electronic Speckle-Pattern Interferometry (ESPI) to observe the temporal behavior of the displacement pattern in metal specimens under fatigue loading. Our hypothesis is that fatigue fracture is preceded by shear instability and the displacement data obtained with ESPI exhibits critical features that indicate shear instability. Our theoretical investigation indicates that shear instability is related to dislocation dynamics and it can be observed by unstable temporal behavior of the displacement field.

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