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Residual stress analysis based on an optical interferometric method SAGNHUN OH, JUN SHITAKA, SANICHIRO YOSHIDA, Southeastern Louisiana Univ — This paper discusses a method of residual stress analysis based on an optical interferometric method known as Electronic Speckle-Pattern Interferometry (ESPI). We apply a small tensile load to the specimen and measure the resultant displacement with ESPI. Our hypothesis is that compressive/tensile residual stress causes acceleration in the same/opposite direction to the displacement due to the tensile load as the material returns/deviates from the equilibrium. Here we evaluate the acceleration by numerically differentiate displacement data taken successive time steps. Our preliminary study supports this hypothesis. The challenge is that the high frequency speckle noise superposed on the ESPI fringe patterns used for the displacement measurement compromises the evaluation of displacement and acceleration. We apply low-pass filtering techniques to remove the noise. Estimated residual stress data is being compared with results from X-ray diffractometry. Recent progress on the low-pass filtering and X-ray diffraction measurement will be reported.

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