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Direct Estimation of Strain Gradient Maps in Plane Strain Indentation TEJAS MURTHY, CHIHYUNG HUANG, SRINIVASAN CHANDRASEKAR, Purdue University — Indentation is a widely used non-destructive means for assaying mechanical properties of metals. *In-situ* Experimental investigations on the extent of deformation and the distinct features of the deformation field around a plane strain wedge indenter were performed. A rigid plastic material (lead) was indented under plane strain conditions with different deformation rates and wedge angles. The region around the indenter was directly observed by tracking asperity movements on the surface of the specimen using high-speed imaging. The digitized images were analyzed using particle image velocimetry (PIV) to obtain velocity fields. Strain rate fields and strain maps were also obtained through analysis of this velocity field. Estimates of the strain gradients at a macro scale have afforded detailed analysis of the size effects in indentation and validation of flow theories at a macroscopic scale.

Tejas Murthy
Purdue University

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