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Technique for Measurement of Droplet Profiles for the Study of Droplet Dynamics on Rough Surfaces JASON SCHMUCKER, EDWARD WHITE, Texas A&M University — A new technique for the measurement of droplet profiles on rough, opaque surfaces has been developed. This non-intrusive method provides full-field, instantaneous measurements of droplet interface heights. The technique consists of illuminating a rough surface by coherent laser light to form a speckle pattern and measuring the deformation of the speckle field by the presence of the droplet. The deformation of the speckle pattern depends upon the surface height and gradient. Computer algorithms identify the droplet contact line and analyze the control and droplet specklegram using an image correlation method to extract the speckle deformation field, providing the necessary information to reconstruct the droplet profile. Reconstruction is performed by a simulated annealing algorithm designed to minimize the error between the measured speckle shift vector field and that of the guessed reconstruction of the droplet profile. Tests of the technique show a satisfactory level of accuracy and spatial resolution, allowing future experimental validation of previously untested computational modeling results.

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