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Optical measurements of pressure and displacement fields at a rough interface ALEXIS PREVOST, JULIEN SCHEIBERT, GEORGES DEBRÉGEAS, LPS-ENS, CNRS-UMR 8550 Paris, France — We report on optical measurements of both pressure and displacement fields at the interface between a rough, nominally flat transparent elastomeric film and a smooth spherical glass lens. The multi-contact interface is imaged by transmission and the pressure field is deduced from the spatial distribution of the transmitted light. The displacement field is obtained using Digital Image Correlation, allowing for a submicron resolution. For normal loading, the radial pressure profiles deviate from Hertz theory, as expected for a rough interface. A good quantitative agreement has been obtained within the statistical description of a rough sphere-on-plane contact by Greenwood and Tripp. When the interface is tangentially loaded below the macroscopic sliding threshold, analysis of the displacement field has shown a coexistence between an inner stuck region and an outer slipping annulus, as suggested by Catteneo and Mindlin. Quantitative comparison with this model yields a good overall agreement. However, small deviations are observed and can be related to the tangential compliance of the rough layer.

Alexis Prevost
LPS-ENS, CNRS-UMR 8550 Paris, France

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