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Friction induced displacement and stress fields within contacts with elastomers ANTOINE CHATEAUMINOIS, CHRISTIAN FRETIGNY, ESPCI, ESPCI TEAM — Friction is known to be associated with strongly heterogeneous stress and displacement fields within the contact zone. However, experimental approaches are often based on the measurement of friction forces (or mean shear stress), which makes difficult a detailed analysis of interface dynamics within sliding contacts. We have developed a new methodology for the determination of the interface shear stress distribution within macroscopic sliding contacts. It is based on an in situ measurement of the displacement field induced at the surface of highly deformable solids such as elastomers. An inversion of this field using contact mechanics models then provides the interface shear stress distribution. The experiments were carried out using two different contact configurations. The first one involves the linear sliding of a glass sphere on the elastomer substrate. The second one corresponds to an original torsional contact configuration which minimizes bulk viscoelastic dissipation during steady state sliding. Experimental distributions of frictional shear stress will be discussed in the light of theoretical models assuming either a constant interface shear stress (Tabor's model) or a local Coulomb's friction law.

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