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Probing locally the onset of slippage at a model multi-contact interface VICTOR ROMERO, ELIE WANDERSMAN, GEORGE DEBRÉGEAS, ALEXIS PREVOST, CNRS / UPMC Univ Paris 06, FRE 3231, Laboratoire Jean Perrin, LABORATOIRE JEAN PERRIN TEAM — We investigate the interfacial dynamics in a frictional joint between a micro-patterned elastomer and a smooth glass slide in the stick-slip regime. A novel technique is developed to decorate the surface of PDMS blocks with thousands of spherical caps (100 μm in curvature) whose positions and heights are controlled at μm scale. Such samples are rubbed against bare glass slides while the macroscopic normal and shear loads are monitored. The use of model spherical asperities provides a direct access to the local normal and shear stress within the frictional joint through optical tracking of the micro-contacts area and in-plane displacement. This method allows us to evidence the existence of one or more slip waves propagating inward from the contact edge right before the onset of slip events. The wave front is found to propagate normally to the iso-pressure contour lines at a velocity proportional to the macroscopic (imposed) shear rate. A simple quasi-static model of the multi-contact interface is derived that qualitatively accounts for the observed dynamics of these slip precursors.

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