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Earthquakes in the Laboratory: Continuum-granular coupling DREW GELLER, SERGIY GERASHCHENKO, SCOTT BACKHAUS, ROBERT ECKE, Los Alamos National Laboratory — Earthquakes in nature feature large tectonic plate motion at large scales of 10-100 km and local properties of the earth on the scale of the rupture width, of the order of meters. Fault gouge generally fills the gap between the large slipping plates and may play an important role in the nature and dynamics of earthquake events. We have constructed a laboratory scale experiment that represents a similitude scale model of this general earthquake description. Two photo-elastic plates (50 cm $\times$ 25 cm $\times$ 1 cm) confine approximately 3000 bi-disperse nylon rods (diameters 0.12 and 0.16 cm, height 1 cm) in a gap of approximately 1 cm. The plates are held rigidly along their outer edges parallel to the gouge with one held fixed while the other edge is driven at constant speed over a range of about 5 cm. The local stresses exerted on the plates are measured using their photo-elastic response, the local relative motions of the plates, i.e., the local strains, are determined by the relative motion of small ball bearings attached to the top surface, and the configurations of the nylon rods are investigated using particle tracking. We report statistical analyses of data obtained from these experimental probes and compare with different avalanche models.

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