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Scaling in a Model of Material Damage with Healing JOSEPH GRAN, JAMES HOLLIDAY, UC Davis, JOHN RUNDLE, UC Davis, Sante Fe Institute, DON TURCOTTE, UC Davis, WILLIAM KLEIN, Boston University —
A variety of studies have modeled the physics of material deformation and damage as examples of generalized phase transitions, involving either critical phenomena or spinodal nucleation. Here we study a model for frictional sliding with interactions $R \gg 1$ and recurrent damage that is parameterized by a process of damage and partial healing during sliding. We define a mapping to a percolation transition, and show that the scaling exponents are, within measurement error, the same as for mean field percolation and spinodal nucleation. Several time dependent healing processes are investigated including instaneous healing. We also investigate the resulting interevent temporal spacing and the frequency of aftershocks and compare our results with experiments and Omori's law.

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