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Elasto-plastic automata with realistic near field interactions: avalanches and diffusion CRAIG MALONEY, Northeastern, BOTOND TYUKODI, DAMIEN VANDEMBROUCQ, ESPCI — We present results on an elasto-plastic automaton model of an athermal amorphous solid under shear. We study four different variants of the model with two different loading geometries and two different stochastic prescriptions (random yield thresholds or random strain amplitudes). We perform a finite size scaling analysis for the avalanche size distribution and single-site displacement and strain statistics. The avalanche size distribution in all four cases is inconsistent with mean-field depinning results. For three of the four variants, the distribution is consistent with previous results from atomistic simulations and other related elasto-plastic models. The fourth seems to exhibit different scaling properties and may lie in a different universality class. The mean-squared displacement exhibits a pronounced dependence on the microscopic ingredients of the model and is completely non-universal. These results show that while certain microscopic ingredients of the model may be irrelevant for the individual avalanches, they may exhibit a profound impact on long-time correlations and long-lived shear localization.

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