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Universality in the Self Organized Critical behavior of a cellular model of superconducting vortex dynamics[1] YUDONG SUN[2], TEGY VADAKKAN, KEVIN BASSLER, The University of Houston — We study the universality and robustness of variants of the simple model of superconducting vortex dynamics first introduced by Bassler and Paczuski in Phys. Rev. Lett. **81**, 3761 (1998). The model is a coarse-grained model that captures the essential features of the plastic vortex motion. It accounts for the repulsive interaction between vortices, the pining of vortices at quenched disordered locations in the material, and the overdamped dynamics of the vortices that leads to tearing of the flux line lattice. We report the results of extensive simulations of the critical "Bean state" dynamics of the model. We find a phase diagram containing four distinct phases of dynamical behavior, including two phases with distinct Self Organized Critical (SOC) behavior. Exponents describing the avalanche scaling behavior in the two SOC phases are determined using finite-size scaling. The exponents are found to be robust within each phase and for different variants of the model. The difference of the scaling behavior in the two phases is also observed in the morphology of the avalanches.

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