

Abstract for an Invited Paper
for the MAR05 Meeting of
The American Physical Society

Stochastic Sandpiles: Scaling and Universality

RONALD DICKMAN, Universidade Federal de Minas Gerais, Brazil

Sandpiles, a class of statistical models of particles diffusing on a lattice, whose dynamics involves a threshold for activity, have attracted great interest in statistical physics. In the simplest case, the model is equivalent to a collection of random walkers with the restriction that an isolated walker is immobile: at least two walkers must occupy the same site to be active. In general, sandpile models exhibit a phase transition between an active stationary state and an absorbing (frozen) one, for which the relevant parameter (analogous to temperature) is the density of walkers, which is conserved by the dynamics. This feature makes it possible to introduce a control mechanism (slow loss of particles, and particle insertion in the absence of activity) that maintains the system at the critical point, in the apparent absence of adjustable parameters yielding self-organized criticality (SOC). In this talk I will describe recent analytical and numerical results on stationary and time-dependent properties, avalanche distributions, the nature of the critical point, and generic slow relaxation in stochastic sandpiles.