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Dynamical Instability in Boolean Networks as a Percolation Problem SHANE SQUIRES, MICHELLE GIRVAN, EDWARD OTT, University of Maryland – College Park — Boolean networks, a widely used model of gene regulatory networks, exhibit a phase transition between a stable regime, in which small perturbations die out, and an unstable regime, in which small perturbations grow exponentially. We show that this phase transition can be mapped onto a static percolation problem which predicts the critical point and the long-time Hamming distance between perturbed and unperturbed systems. The results, which apply to Boolean networks with a broad class of topologies and update functions, are confirmed by numerical simulations.

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