

1086-VN-1130 **Jacob T Hughes*** (jthughes@math.ucsd.edu). *Random Lights Out Processes on Graphs.*

Lights Out is a single player game on graph G . The game starts with a coloring of the vertices of G with two colors, 0 and 1. At each step, one vertex is toggled which switches the color of that vertex and all of its neighbors. The game is won when all vertices have color 0. We consider the stochastic process arising from toggling a sequence of random vertices. We demonstrate how the process can be viewed as a random walk on an associated state graph. We then find the eigenvalues of the state graph, and use them to bound the rate of convergence and hitting times. We show that the distribution of this random process converges to the uniform distribution and show the χ squared distance after t steps is less than e^{-c} for all $t > \frac{n}{2}(1 + \frac{1}{r_2}) \log(r_2) + c$, where r_2 is the rank of the adjacency matrix of the state graph plus the identity matrix taken over \mathbb{Z}_2 . We also provide bounds on the average number of steps until this random process reaches the all 0 coloring that are asymptotically tight for many families of graphs. (Received September 22, 2012)