

We study two deterministic analogues of random walks. The first is the chip-firing game, a single player game played by moving chips around a directed graph, popularised by Björner and Lovász. We find an efficient simulation of boolean circuits and Turing machines using instances of the chip-firing game – after assigning a fixed strategy to the player. The second is the Propp machine, or the rotor router model, a quasirandom model introduced by Priezzhev. We improve results of Kijima et al. and show a bound of  $\mathcal{O}(m)$  on the discrepancy of this process from a random walk on  $d$ -regular graphs with  $m$  edges.