1123-60-409 **Daniel C Jerison** and **Lionel Levine***, 438 Malott Hall, Ithaca, NY 14850, and **John Pike**.

Mixing time and eigenvalues of the abelian sandpile Markov chain.

The abelian sandpile model defines a Markov chain whose states are integer-valued functions on the vertices of a simple connected graph G. The eigenvalues and eigenvectors of this chain can be expressed in terms of 'multiplicative harmonic functions' on the vertices of G, which are complex-valued functions h satisfying

$$\prod_{y\sim x}\frac{h(y)}{h(x)}=1$$

for all vertices x, where the product is over all neighbors y of x. If we fix $h(z)=1$ for a sink vertex z, then there are finitely many such functions, equal in number to the spanning trees of G.

We show that the spectral gap of the sandpile chain is within a constant factor of the length of the shortest non-integer vector in the dual Laplacian lattice, while the mixing time is at most a constant times the smoothing parameter of the Laplacian lattice. We find a surprising inverse relationship between the spectral gap of the sandpile chain and that of simple random walk on G: If the latter has a sufficiently large spectral gap, then the former has a small gap! (Received August 30, 2016)