Organized versus self-organized criticality in the abelian sandpile model

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Abstract: We define stabilizability of an infinite volume height configuration and of a probability measure on height configurations. We show that for high enough densities, a probability measure cannot be stabilized. We also show that in some sense the thermodynamic limit of the uniform measures on the recurrent configurations of the abelian sandpile model (ASM) is a maximal element of the set of stabilizable measures. In that sense the self-organized critical behavior of the ASM can be understood in terms of an ordinary transition between stabilizable and non-stabilizable.

Key-words: Self-organized criticality, abelian sandpile model, activated random walkers, stabilizability.

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