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Universality Class in Abelian Sandpile Models with Stochastic Toppling Rules

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Abstract: We present a stochastic critical slope sandpile model, where the amount of grains that fall in an overturning event is stochastic variable. The model is local, conservative, and Abelian. We apply the moment analysis to evaluate critical exponents and finite size scaling method to consistently test the obtained results. Numerical results show that this model, Oslo model, and one-dimensional Abelian Manna model have the same critical behavior although the three models have different stochastic toppling rules, which provides evidences suggesting that Abelian sandpile models with different stochastic toppling rules are in the same universality class.

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