

Conservation laws for strings in the Abelian Sandpile Model

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The Abelian Sandpile generates complex and beautiful patterns and seems to display allometry. On the plane, beyond patches, patterns periodic in both dimensions, we remark the presence of structures periodic in one dimension, that we call strings. We classify completely their constituents in terms of their principal periodic vector k , that we call momentum. We derive a simple relation between the momentum of a string and its density of particles, E , which is reminiscent of a dispersion relation, $E=k^2$. Strings interact: they can merge and split and within these processes momentum is conserved. We reveal the role of the modular group $SL(2,Z)$ behind these laws.

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