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Avalanche Average Shapes: Mean-field temporal average avalanche shape STEFANOS PAPANIKOLAOU, LASSP, Cornell Univ., CHRISTOPHER R. MYERS, Computational Biology Service Unit, Cornell Univ., FRANCESCA COLAIORI, CNR-INFM, Dipartimento di Fisica, Universita "La Sapienza", Roma, KAREN E. DANIELS, North Carolina State U., GIANFRANCO DURIN, INRIM and ISI foundation, Torino, Italy, STEFANO ZAPPERI, INFM-CNR center of Modena and ISI in Torino, Italy, JAMES P. SETHNA, LASSP, Cornell Univ. — The average temporal shape of avalanches has been a fruitful application of universality and critical scaling, with experimental and theoretical investigations particularly in the field of magnetic Barkhausen noise. The mean-field shapes of these avalanches have been thought to come in two forms: inverted parabolas for the infinite-range model and one lobe of a sinusoid for the single-degree of freedom ABBM model. We show that the infinite-range model can be mapped onto the earlier ABBM model, and that the average shape for both mean field theories is an inverted parabola, seemingly resolving the ambiguity. However, we also propose a new mean-field model including the effects of local saddle-node bifurcations on the dynamics, and analyze both its predictions for dynamical exponents and temporal average shapes. We compare with experimental results on sheared granular materials.

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