
Negative avalanches and anomalous dilation in a granular fault

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Résumé

When slowly shearing a granular system, we expect a slow accumulation of mechanical energy and a global dilation, interrupted by sudden avalanche-like events of energy release and a contraction of the structure. However, in the case of a compressed medium, we report a much richer behavior of the avalanches, including all four possible combinations between sudden contraction or sudden dilation with abrupt energy release or abrupt energy accumulation. Modifications in the stress network, captured by photoelasticity, can help us understand the four scenarios, particularly the totally counterintuitive one of sudden energy accumulation and dilation, that usually liberates a large amount of acoustic energy. Decoding it in the context of earthquakes: a large quake may not result in a relaxation of the fault, but in a more charged configuration, more likely to trigger other extreme events.

Mots-Clés: avalanches, granular fault, laboratory experiments, scale invariant

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