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**Spatiotemporal Chaotic unjamming and jamming in granular avalanches** ZIWEI WANG, JIE ZHANG, Shanghai Jiaotong University — The unjamming transition, is of crucial importance in studying natural disasters such as snow avalanches, landslides and earthquakes. Here we provides a new perspective to understand such transitions from the dynamical systems theory and show that in a novel toy-model system – a rotating drum partially filled with bidisperse disks to create avalanches, the dynamical variable – the first Lyapunov vector can be well defined and measured. We observed a strong spatial correlation between the modulus of the first Lyapunov vector and velocity field, and linear correlations between the global Lyapunov vector, its growth rate and the total velocity temporally. The anatomy of the velocity of each particle and the number of moving particles leads to a mean-field model, where both the spatial and temporal correlations between such quantities can be understood. What’s more, we have investigated the fluctuations of particle motions, i.e. the non-affine motions, during the avalanche process, revealing an intrinsic disorder characteristic of the avalanche at the particle levels and the temporal correlations among geometrical and mechanical quantities at the macroscopic levels.

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