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On the stability of amorphous solid JIE LIN, New York University, Center for Soft Matter Research, ALAA SAADE, LPS, ENS, EDAN LERNER, New York University, Center for Soft Matter Research, ALBERTO ROSSO, Laboratoire de Physique Théorique et Modèles Statistiques (UMR CNRS 8626), Université de Paris-Sud, MATTHIEU WYART, New York University, Center for Soft Matter Research — The plasticity of amorphous material occurs via local plastic rearrangements, shear transformation zones(STZ). The elastic coupling between STZs can generate large-scale avalanches of plastic events. We study the stability condition of amorphous solid toward extensive avalanches. We argue that stability is controlled by the distribution $P(x)$ of the local stress increase x that would lead to an instability. In particular stability requres that $P(x) \sim x^{\theta}$ where θ satisfies a lower bound. To investigate this, we use a elasto-plastic model based on two ingredients: local plastic events above microscopic stress, and the non-local elastic stress release generated by these plastic events. For a class of models of lond range interaction, θ is found to lie near saturation. For quadrupole interaction, the model yields $\theta \approx 0.6$ in 2D, and $\theta \approx 0.4$ in 3D.

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