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Understanding shear bands characteristics and formation in model glasses through the measure of the local yield stress.

Many phenomena remain poorly understood in amorphous materials such as plasticity and shear banding, their brittleness and disordered structure making it difficult to study them experimentally. As a consequence, we use model two-dimensional Lennard-Jones glasses and measure their local yield stress, a measure of the local softness, as presented in [1]. This method is nonperturbative and is applied on a well-controlled length scale. Applying it on well-relaxed glass under simple shear loading showed that the first plastic events create a local yield stress [2] diminution in the material which cause the emergence of a shear band [3]. Furthermore, we find that a single plastic event suffices to bring the local yield stress distribution to a well-defined value, thus essentially erasing the memory of the initial structure.

[1] A. Barbot et al., Phys. Rev. E, 97, 033001 (2018)

[2] S. Patinet et al., arXiv::cond-mat/1906.09818 (2019)

[3] A. Barbot et al., arXiv::cond-mat/1906.09663 (2019)

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