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Shearbanding in Amorphous Solids and Interacting Eshelby Singularities H.G.E. HENTSCHEL, Emory University, Atlanta, GA, RATUL DASGUPTA, ITAMAR PROCACCIA, Weizmann Institute, Rehovot, Israel — We will describe recent work in which it was found that the fundamental shear-localizing instability of amorphous solids under external strain, which eventually results in a shear band and failure, consists of a highly correlated line of Eshelby quadrupoles all having the same orientation and some density ρ. We describe how the energy $E(\rho, \gamma)$ associated with such highly correlated structures as a function of the density ρ and the external strain γ can be calculated. We then show that when the strain γ is smaller than some characteristic yield stress γ_y the minimum energy solution is attained for $\rho = 0$ (i.e. isolated localized plastic events). While for $\gamma \geq \gamma_y$ there is a bifurcation allowing a finite density of quadrupoles. We finally suggest how the universal Johnson-Samwer $T^{2/3}$ temperature reduction of the yield stress in metallic glasses can be accounted for by such ideas.

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