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Non-affine reorganizations in glassy polymers under applied strain in the plastic regime DIDIER LONG, LUCA CONCA, CNRS/Solvay, ALAIN DEQUIDT, Université de Clermont-Ferrand, JEAN-YVES DELANNOY, PAUL SOTTA, CNRS/Solvay, FRANÇOIS LEQUEUX, CNRS/ESPCI — A model for the dynamics of non-polar polymers, based on percolation of slow subunits, has been proposed and developed over the past ten years. This model has been extended for describing plastic deformation of glassy polymers. It has been proposed that the applied stress results in an acceleration of the dynamics of the subunits. At deformation amplitudes of a few percent, we can observe plastic yield. The onset of plasticity is accompanied by an increase of the non-affine nature of the deformation at microscopic scales. Localization phenomena are observed in the plastic regime. We present here a detailed study of the complex reorganization which takes place on a scale of a few nanometers. We show that the correlation length of non-affine deformation increases at yield, but remains finite, with typical value 10-20 nm, corresponding to typical distance between shear bands. We compare in detail the microscopic mechanisms at play during shear deformation, uni-axial extension and compression.

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