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Stretched-exponential relaxation and hidden power laws in a solidifying 2D liquid[1] ALEXANDER PATASHINSKI, Northwestern University, RAFAL ORLIK, Orlik-software LLC, Poland, ANTONI MITUS, Polytechnic University, Wroclaw, Poland, BARTOSZ GRZYBOWSKI, MARK RATNER, Northwestern University — In a 2D Lennard-Jones liquid, the number of particles keeping their memorized nearest neighbors is found to decay stretched-exponentially; the probability for a particle to keep the same 6 nearest neighbors for a time t can be fitted with a power law. Using the lists of nearest neighbors (*nn*-lists) as a topological order parameter, we studied the dynamics of the structure underlying these signature features of complexity in materials. The *nn*-changes randomly appear along the boundaries of better ordered blocks at a time scale of the order of particles vibration period; these boundaries, and the shapes of the blocks, perform a next time-scale random motion. Particles diffusion includes periods of slow and fast diffusion. We discuss the feed-back interactions between nn-changes, block boundaries motion, and orientation relaxation in the system.

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