Abstract Submitted
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Sudden ridge collapse in the stress relaxation of thin crumpled polymer films INGO DIERKING, PAUL ARCHER, University of Manchester — Uniform compression of thin crumpled sheets subjected to a constant weight has been shown to exhibit a remarkably wide range of scaling behaviour, covering up to five orders of magnitude [1], i.e. time scales from seconds to weeks. We demonstrate that this scaling behaviour is not smooth, but rather interrupted by sudden changes in height of the uniformly compressed crumple, which we attribute to sudden ridge collapses. The height of the discontinuous jumps due to sudden ridge collapse during the compression process increases with increasing thickness of the polymer film. This is attributed to the fact that thick films exhibit a smaller defect density, but increased defect length. Interestingly, when plotting the time laps between successive ridge collapses as a function of time, the data collapses to a single line for all film thicknesses, with a slope of $d\Delta t/dt=1$ over a scaling regime of four orders of magnitude. Possible explanations will be discussed. [1] K. Matan, R.B. Williams, T.A. Witten, S.R. Nagel, Phys. Rev. Lett., 88, (2002), 076101.

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