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Title: "Conveyor Belt" Model for Interfacial Cracks

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In-plane fracture propagation provides a simplified model system to study scaling properties of fracture surfaces. A lasting headachehas been, however, the discrepancy between the measured roughness exponent and that found in the elastic line models [D. Bonamy, S. Santucci and L. Ponson, Phys. Rev. Lett. 101, 045501 (2008)]. Recently, Santucci et al. [S. Santucci, M. Grob, R. Toussaint, J. Schmittbuhl, A. Hansen and K. J. MÂl¯y, Europhys. Lett. 92, 44001 (2010)] have demonstrated that there are two scaling regimes; one on small scales and one on large scales. The large-scale roughness exponent is consistent with the elastic line model, whereas on small scales a larger exponent is found. This exponent is consistent with the stress-weighted percolation model [J. Schmittbuhl, A. Hansen and G. G. Batrouni, Phys. Rev. Lett. 90, 045505 (2003)]. In order to study numerically in-plane crack propagation and in particular the appearance of two scaling regimes, we introduce a "conveyor belt" model for crack propagation. The model consists of a square lattice where each node is attached through a fiber to a soft plane. A gradient in the breaking thresholds is introduced. Under load, a fracture front develops that moves in the direction of larger thresholds. As the process progresses, layer after layer of new fibers are added on the intact side of the system, whereas layers with all fibers broken are removed. In this way, steady-state propagation of the fracture front is obtained. We present preliminary results obtained with this model, including Family-Vicsek scaling in both system size and threshold gradient.