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Self-organized criticality of elastic networks MYKYTA V. CHUBYNSKY, M.-A. BRIÈRE, NORMAND MOUSSEAU, Département de physique and RQCHP, Université de Montréal, Montréal, Québec, Canada — We consider a model of elastic network self-organization inspired by studies of covalent glasses [1,2]. In the model, networks self-organize by avoiding stress whenever possible, but otherwise are random. Instead of a single rigidity percolation transition, with percolation always absent below a certain bond concentration and always present above, we find that the percolating rigid cluster exists with a probability between 0 and 1 in a finite range of bond concentrations, the *intermediate phase*. A power-law distribution of non-percolating cluster sizes, normally observed at a single critical point in percolation transitions, is seen everywhere in the intermediate phase. There is also a finite probability of percolation appearing and disappearing upon the application of a microscopic perturbation (addition or removal of a single bond). These properties indicate that in this phase the network maintains itself in a critical state on the verge of rigidity, a signature of self-organized criticality, but in a system at equilibrium.

[1] M.V. Chubynsky, M.-A. Brière and N. Mousseau, Phys. Rev. E 74, 016116 (2006)
[2] M.-A. Brière, M.V. Chubynsky and N. Mousseau, cond-mat/0610557

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