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# Failure by fatigue of hierarchical load-transfer models: lifetime of infinite systems

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Cellular automata of the fiber-bundle type have been extensively used to model the fracture of heterogeneous materials in a broad variety of applications, from engineering to earthquake mechanics. There are several "flavours" of fiber-bundle models, but the hierarchical, fractal-tree type is the best suited to simulate the long-range elastic interactions characteristic of earthquake phenomena. It is well known that the time-independent hierachical fiber-bundle model is intrinsically weak, in the sense that the strength of such systems goes to zero as the size of the system goes to infinity. As for the time-dependent one, where the elements fail by fatigue, the question is: Is there any time threshold of stability in a structure formed by $N$ elements, in the limit when $N$ tends to infinity? There is no rigorous proof, but the consensus to this question is yes. Here we extend our previous work on these systems up to a size $N = 10^6$ using a power law breakdown rule and a new more efficient Monte Carlo method. The new results confirm this positive consensus. Implications for seismology are stressed.