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Interlocking in stochastically microcracked materials provides tensile stiffness deep into the granular regime. CATALIN PICU, ANIRBAN PAL, Rensselaer Polytechnic Institute — We study the mechanical behavior of two- and three-dimensional, stochastically microcracked continua in the range of crack densities above the transport percolation threshold. We show that these materials retain stiffness under tensile loading up to crack densities much larger than the transport percolation threshold, due to topological interlocking of sample sub-domains. At these crack densities the material is granular with a broad distribution of fragment sizes. As the crack density increases, this distribution becomes narrower. We relate the variation of the stiffness with the evolution of the fragment size distribution and the effective density of microcracks. We associate this behavior to that of itacolumite, a sandstone of unusual flexibility.

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