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Quicksand DANIEL BONN, ENS/LPS and WZI, UvA — Quicksand is the generic name for unstable soils reputed to trap anyone who treads on it. Popular wisdom has it that one should not move when trapped in quicksand, as motion makes one sink in even deeper and that once trapped, it is difficult to escape. We provide an explanation for these observations by studying the most commonly encountered form of natural quicksand. We show that a spectacular liquefaction of the material occurs when a stress is applied to the material: the liquefaction is the reason why one sinks away, and it is more pronounced for larger stresses. By constructing laboratory quicksand, we demonstrate that the liquefaction is due to the structure: quicksand is a loose granular packing of sand particles stabilized by a clay matrix that forms a particulate gel. The stress liquefies the clay matrix, and the granular assembly collapses, expulsing water. This results in a densely packed system that practically impossible to dilate: it is for this reason that once trapped it is difficult to get out of quicksand. A sinking test demonstrates that, due to buoyancy, it impossible to drown in the quicksand.

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