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Shear strength of vibrated granular/granular-fluid mixtures BRIAN UTTER, RALPH HERMAN, BEN FOLTZ, James Madison University — The behavior of dense granular materials can be characterized by the continuous forming and breaking of a strong force network resisting flow. This jamming/unjamming behavior is typical of a variety of systems and is influenced by factors such as grain packing fraction, applied shear stress, and the random kinetic energy of the particles. We present experiments on shear strength of granular and granular-water mixtures under the influence of external vibrations, one parameter that leads to unjamming. We use low vibration (< 1g) and slow shear and measure avalanching statistics in a rotating drum and the torque required to move a stirrer through a sand/water mixture. We find that external vibration (i) increases granular strength at small vibrations in the dry system, (ii) removes history dependence (memory), and (iii) decreases shear strength at all accessible saturation levels in the sand-fluid system. Additionally, shear strength is found to be smallest for both dry and completely saturated mixtures. Additional ongoing experiments probe beyond a dimensionless acceleration of 1 and explore jamming and surface chemistry effects in the avalanching flow of granular/fluid mixtures.

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