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Bi-modal behavior and compression-induced crystallization of weakly bi-disperse granular packings KAMRAN KARIMI, CRIAG MALONEY, Carnegie Mellon University — We perform computer simulations of 2D bidisperse frictionless granular packings for two different particle mixtures. One which is strongly bi-disperse, the other which is only weakly bi-disperse. Despite pronounced crystalline order in the weak system, both share common features near the jamming transition. Near jamming, the probability distribution of particle-wise hydrostatic pressure has a long exponential tail. Force chains are also apparent and have similar spatial structure. At densities further above the jamming transition, the behavior of the two mixtures diverges. The strongly bi-disperse system develops an essentially Gaussian pressure distribution (in agreement with previous results on monodisperse, amorphous, 3D packings), while the weakly bi-disperse system shows bimodal behavior in which the large particles have larger average pressure than the small particles. Furthermore, we show that the ratio of average large particle pressure to small particle pressure is a non-trivial function of density, and we speculate that this effect is related to an observed compression-induced increase in crystalline order.

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