Jamming transition of two-dimensional monodisperse soft particles\textsuperscript{1} WEN ZHENG, NING XU, University of Science and Tech of China — By finding local minima of a thermodynamic-like potential, we generate jammed packing of monodisperse frictionless circular disks under constant pressure in two dimensions. Contrast to the bidisperse systems, the packing of monodisperse systems display a wide distribution of packing fractions even the pressure close to zero, so that essentially all configurations are the coexistence of amorphous solid and triangular lattice in the thermodynamic limit. Moreover, both the local packing fractions and density of vibrational states (DOVS) demonstrate that jamming physics dominated the behaviour of amorphous solid constituent in two dimensional monodisperse system, and the local packing fraction of jamming transition corresponds to the previously measured value for random close packing $\varphi = 0.84$. In fact, our results provide a well-defined meaning for ”random close packing” in two dimensional monodisperse systems. We also obtain numerical estimates of the random close packing density, which provides new insights into the mathematical problem of packing spheres in large dimensions.

\textsuperscript{1}This work is supported by National Natural Science Foundation of China No. 21325418 and 11574278, and Fundamental Research Funds for the Central Universities No. 2030020028 and 2030020023.

Wen Zheng
University of Science and Tech of China

Date submitted: 29 Nov 2016

Electronic form version 1.4