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The Transition of Two-Dimensional Hard Spheres from Liquid to Solid Regimes Under Gravity Using a Global Equation of State ALISON KOSER, PAUL QUINN, Kutztown University of Pennsylvania — In a previous paper, Hong started with the Enskog equation for hard spheres of mass m and diameter d under gravity., and derived an exact equation for an equilibrium density profile at a specific temperature T. [*Physica A*, **271**, 192 (1999)] This leads to a transition between the liquid and the solid regime that is temperature dependent. The size of the solid regime can be predicted using the temperature of the system obtained from the density profile. In a previous paper, Luding derives a new global equation of state for hard spheres in two-dimensions under gravity. [*Phys. Rev. E*, 163(2001)] Using this equation, we obtain a more exact equation for an equilibrium density profile at a temperature Tin two-dimensions. We use this equation with MD simulated data to obtain relationships of the number of solid layers, the center of mass, and the fluctuations of the center of mass as a function of T.

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