Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Polydisperse sphere packing in high dimensions, a search for an upper critical dimension PETER MORSE, Department of Physics: University of Oregon, MAXIME CLUSEL, Laboratoire Charles Coulomb UMR 5221, CNRS and Universite Montpellier 2, F-34095, Montpellier, France, ERIC CORWIN, Department of Physics: University of Oregon — The recently introduced granocentric model for polydisperse sphere packings has been shown to be in good agreement with experimental and simulational data in two and three dimensions. This model relies on two effective parameters that have to be estimated from experimental/simulational results. The non-trivial values obtained allow the model to take into account the essential effects of correlations in the packing. Once these parameters are set, the model provides a full statistical description of a sphere packing for a given polydispersity. We investigate the evolution of these effective parameters with the spatial dimension to see if, in analogy with the upper critical dimension in critical phenomena, there exists a dimension above which correlations become irrelevant and the model parameters can be fixed *a priori* as a function of polydispersity. This would turn the model into a proper theory of polydisperse sphere packings at that upper critical dimension. We perform infinite temperature quench simulations of frictionless polydisperse sphere packings in dimensions 2-8 using a parallel algorithm implemented on a GPGPU. We analyze the resulting packings by implementing an algorithm to calculate the additively weighted Voronoi diagram in arbitrary dimension.

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Date submitted: 11 Nov 2011 Electronic form version 1.4