

Abstract Submitted  
for the MAR16 Meeting of  
The American Physical Society

**Bias-free simulation of diffusion-limited aggregation on a square lattice** YEN LEE LOH, Univ of North Dakota — We identify sources of systematic error in traditional simulations of the Witten-Sander model of diffusion-limited aggregation (DLA) on a square lattice. Based on semi-analytic solutions of the walk-to-line and walk-to-square first-passage problems, we develop an algorithm that reduces the simulation bias to below  $10^{-12}$ . We grow clusters of  $10^8$  particles on  $65536 \times 65536$  lattices. We verify that lattice DLA clusters inevitably grow into anisotropic shapes, dictated by the anisotropy of the aggregation process. We verify that the fractal dimension evolves from the continuum DLA value,  $D = 1.71$ , for small disk-shaped clusters, towards Kesten's bound of  $D = 3/2$  for highly anisotropic clusters with long protruding arms.

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Date submitted: 06 Nov 2015

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