

1067-AB-2012 **Tobias Friedrich***, Max-Planck-Institut für Informatik, Campus E1.4, 66123 Saarbrücken,
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Growth models like the rotor-router model or internal diffusion-limited aggregation (IDLA) contain very surprising and mathematically not well understood structures. Many of these structures only become evident if sufficiently many particles are involved. Unfortunately, traditional step-by-step simulation requires a runtime quadratic in the number of particles. Based on a “least action principle” we present an algorithm which computes the final state of several growth models without computing all intermediate states. Starting from an educated guess for the so-called odometer, we successively correct under- and overestimates and provably arrive at the correct final state. For the rotor-router model this gives a close-to-linear runtime behavior and allows simulations of up to ten billion particles. (Received September 22, 2010)