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1 Dimensional DLA

Diffusion limited aggregation (DLA) in 2 or more dimensions is an infamously difficult model for the growth of a random fractal. DLA was introduced in 1981 and attracted massive attention (63,400 Google results for “diffusion limited aggregation”). Kesten’s 1987 upper bound is almost the only proven result on it.

We define a variation of DLA in one dimension. This becomes interesting when the random walk generating the DLA has arbitrary long jumps. It turns out that the growth rate of the aggregate depends on the step distribution in complex ways. In particular there are three phase transitions in the behaviour when the step distribution has finite expectation, finite variance, and finite third moment.

Joint work with Gidi Amir, Itai Benjamini and Gadi Kozma.