Scaling Limits for Internal Aggregation Models with Multiple Sources

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We study the scaling limits of three aggregation models on the lattice: internal DLA, in which particles perform random walks until reaching an unoccupied site; the rotor-router model, in which particles perform deterministic analogues of random walks; and the divisible sandpile, in which each site distributes its excess mass equally among its neighbors. As the lattice spacing tends to zero, all three models are found to have the same scaling limit, which we describe as the solution to a certain PDE free boundary problem. In particular, internal DLA has a deterministic scaling limit. Our results apply both to the case of multiple point sources and to the Diaconis–Fulton smash sum of domains.