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Scaling Behavior of an Aggregation-Migration Model

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Abstract: We study the kinetic behavior of a two-species aggregation-migration model in which an irreversible aggregation occurs between any two clusters of the same species and a reversible migration occurs simultaneously between two different species. For a simple model with constant aggregation rates and with the migration rates $K_A(i;j)=K'_A(i;j) \propto ij^{v_1}$ and $K_B(i;j)=K'_B(i;j) \propto ij^{v_2}$, we find that the evolution behavior of the system depends crucially on the values of the indexes v_1 and v_2. The aggregate size distribution of either species obeys a conventional scaling law for most cases. Moreover, we also generalize the two-species system to the multi-species case and analyze its kinetic behavior under the symmetrical conditions.

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Key words: kinetic behavior, aggregation-migration process, scaling law

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