

Novel Biased Aggregation-Annihilation Model

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Abstract: We propose a novel two-species aggregation-annihilation model, in which irreversible aggregation reactions occur between any two aggregates of the same species and biased annihilations occur simultaneously between two different species. The kinetic scaling behavior of the model is then analytically investigated by means of the mean-field rate equation. For the system without the self-aggregation of the un-annihilated species, the aggregate size distribution of the annihilated species always approaches a modified scaling form and vanishes finally; while for the system with the self-aggregation of the un-annihilated species, its scaling behavior depends crucially on the details of the rate kernels. Moreover, the results also exhibit that both species are conserved together in some cases, while only the un-annihilated species survives finally in other cases.

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Key words: kinetic behavior, aggregation-annihilation, scaling law, rate equation

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