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Quantifying growth and breakage of agglomerates in fluid-particle flow using discrete particle method

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Abstract

The cohesive solids in liquid flows are featured by the dynamic growth and breakage of agglomerates, and the difficulties in the development, design and optimization of these systems are related to this significant feature. In this paper, discrete particle method is used to simulate a solid-liquid flow system including millions of cohesive particles, the growth rate and breakage rate of agglomerates are then systematically investigated. It was found that the most probable size of the agglomerates is determined by the balance of growth and breakage of the agglomerates, the cross point of the lines of growth rate and breakage rate as a function the particle numbers in an agglomerate marks the most stable agglomerate size. The finding here provides a feasible way to quantify the dynamic behaviors of