

CFD-PBE simulation of Crystallization in Continuous Taylor-Couette Reactor with Discrete method

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The Taylor-Couette Reactor(TCR) with axial flow is simulated. CFD program was used for calculation of fluid dynamics of Taylor vortex flow and crystallization and particle classification system. The discrete method is chosen to solve the population balance equation. The kinetics of Ammonium sulfate incorporating nucleation, growth, aggregation and breakage is included in the model. Gravitational and drag force balance affect the particles, when the TCR is vertically located. Thus, the particles movement depends on the size of particles and operating condition.

The Taylor vortex moving region was determined for the various rotational speeds of the inner cylinder and inlet flow rates. Furthermore, cases studies, involving crystallization kinetics were designed to identify the model. Then, the TCR applied as a crystallizer was proposed, which simultaneously classify the crystals.