

1. Modeling and Simulation of Crystallization Processes

Population balance systems model the behavior of complex flow systems involving numbers of entities such as particles, drops, bubbles or cells. Typical examples are droplets in clouds or particles in chemical processes like precipitation. The model of population balance systems does not describe the behavior of individual particles but the behavior of a particle size distribution (PSD). This is the quantity of interest in applications.

Simulations of population balance systems can be used to study the behavior of crystallization, polymerization, pharmaceutical productions, dispersed phase distribution in multiphase flows, growth of microbial and cell populations.

The aim of this project is to develop an efficient and robust numerical scheme for simulating population balance systems with two internal coordinates in time-dependent domains. This project also involves implementation of the developed numerical scheme in our in-house finite element package ParMoon.

Research Areas: *Crystallization Processes; Computational Mathematics; Modeling and Simulation; Finite Element Methods; Moving boundaries*

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