

Modelling, simulation, and optimization of impinging jet mixers for pharma applications

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This project applies modelling and simulation to investigate impinging-jet mixers, a key technology in pharmaceutical manufacturing where precise mixing governs product quality and consistency. Computational fluid dynamics (CFD) models are developed to capture the complex hydrodynamics, turbulence, and mass transfer phenomena occurring when two or more liquid jets collide at high velocity. Simulation results provide insight into mixing efficiency, energy dissipation, and micromixing timescales critical for crystallization, nanoparticle synthesis, and formulation processes. By linking model predictions with process performance, the study supports optimization of mixer design and operating conditions, reducing experimental effort while enhancing scalability and regulatory robustness.