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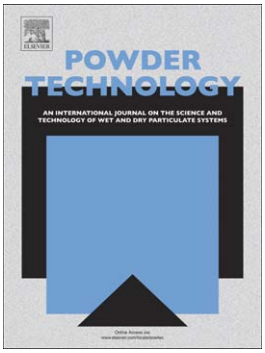

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Enhancing the Physical Modeling Capability of Open-Source MFIX-DEM Software for Handling Particle Size Polydispersity: Implementation and Validation

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Abstract

Multiphase flows are ubiquitous in many industrial processes. The inherent coupling of different phases poses many unique challenges in predicting and effectively controlling these processes. Hence, computational modeling and simulation offers a viable approach to overcome these challenges. In this study, we present recent development efforts for enhancing the physical modeling capabilities of an open-source computational modeling tool for real life industrial multiphase processes by enabling particle-size polydispersity and demonstrating with an associated validation study. The proposed implementation was performed in MFIX open-source framework due to its unique feature of tightly integrated computational fluid dynamics and discrete element method solvers for simulating coupled continuum fluid and granular flows. We have implemented the polydispersity feature in a minimally invasive way and provided means to allow easy specification of an arbitrary particle size distribution function, which also enables the user to easily handle an arbitrary number of solid phases, each possessing a distinct arbitrary particle-size distribution. To establish the credibility

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