

## *The Capabilities and Limitations of Commercial CFD Software in Simulating the Behavior of Fluidized-Beds*

Fariborz Taghipour

*Department of Chemical & Biological Engineering, University of British Columbia  
2360 East Mall, Vancouver, BC, V6T 1Z3, Canada*

With the advent of increased computational capabilities computational fluid dynamics, CFD, is emerging as a very promising tool in modeling hydrodynamics. While it is now a standard tool for modeling single-phase flows, it is at the development stage for multiphase systems, such as fluidized beds. Despite the modeling challenges, application of CFD to model fluidized bed hydrodynamics continues to develop, as it has many advantages including design optimization and scale-up of such systems. Some of the correlations used in the models, however, remain to be empirical or semi-empirical. As a result, the model and its parameters must be evaluated against experimental measurements obtained at similar scale and configurations.

We will review the main approaches to modeling the hydrodynamics of fluidized beds available in commercial CFD software and discuss their advantages and disadvantages. CFD prediction of hydrodynamics for a number of fluidization conditions will be presented and compared with experimental results. In each case, the strengths and weaknesses of CFD model in predicting the hydrodynamics will be addressed. In particular, the importance of the dominant forces under specific conditions, such as cohesive inter-particle forces, will be discussed. Suggestions will be made for increasing the accuracy of the models in predicting fluid bed hydrodynamics.