# FLUIDIZATION OF IRREGULAR PARTICLES - PART II: A PARTICLE-RESOLVED SIMULATION METHOD TO MODEL HYDRODYNAMIC INTERACTIONS

Andriarimina Daniel Rakotonirina, Fluid Mechanics Department, IFP Energies Nouvelles, Rond-point de l'Echangeur de Solaize, BP 3, 69360 Solaize, France
andriarimina-daniel.rakotonirina@ifp.fr
Anthony Wachs, Departments of Mathematics and Chemical & Biological Engineering, University of British Columbia, Vancouver, BC, Canada
Abdelkader Hammouti, Fluid Mechanics Department, IFP Energies Nouvelles, Rond-point de l'Echangeur de Solaize, BP 3, 69360 Solaize, France

Irregular particle shapes are ubiquitous in many real-life systems and in particular in the chemical engineering industry. Most of the corresponding numerical simulations are carried out using spherical particles due to the lack of appropriate numerical methods at the particle level or appropriate closure laws for hydrodynamic and collisional interactions in Euler-Lagrange and Euler-Euler models. Since in Part I, we presented a numerical technique implemented in our granular code Grains3D to treat the collisional behaviour of particles of (almost) arbitrary shape, we are now in a favourable position to suggest a corresponding Particle-Resolved Simulation (PRS) method to which Grains3D is coupled to (1,2,3). It is based on a Distributed Lagrange Multiplier/Fictitious Domain technique combined with Finite Volume/Staggered Grid discretization (2,3), that supplies solutions of satisfactory accuracy. This study aims to go one step further and to extend our numerical method to non-convex particles. This extension is implemented in our parallel numerical platform PeliGRIFF (4) . We illustrate the novel simulation capabilities of PeliGRIFF on the problem of the fluidization of trilobic/quadrilobic particles encountered in Oil & Gas catalytic reactors. First, we assess the space convergence and overall accuracy of the computed solution in the case of the flow past an infinite array of trilobes/quadrilobes. Then, we show results of the flow through a fixed bed made of trilobes/quadrilobes at random loose packing. Finally, we present preliminary results relevant to an actual fluidization. In conclusion, we discuss the computing challenges of these simulations and the integration of their results in a comprehensive multi-scale approach.

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