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PERFORMANCE OF DISCRETE AND CONTINUOUS MODELS FOR THE SIMULATION OF GRANULAR FLOW IN A ROTATING DRUM

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Abstract. In this work, the performance of discrete and continuous computational models to address the dynamics of granular flow in a rotating drum under different regimes is studied. The results are compared with experimental observations on a pilot plant scale drum. For the discrete modeling, the Discrete Element Method (DEM) was used, while for the continuous model the $\mu(I)$ rheological model was used on the general structure of the Volume-Of-Fluid (VOF) method of OpenFOAM(R). Four test cases with different filling levels and rotational speeds are studied, and the results are analyzed in terms of solids distribution, particle velocity and mixing patterns. The distribution of solids and velocities for each of the tests considered are quite similar between both computational techniques and the experimental observations. These results suggest that, taking into account the computational costs of each strategy, the use of a continuous model is more appropriate to simulate industrial-scale systems. However, in order to replicate an even larger range of regimes using continuous models, the non-local rheology of the granular material must be taken into account in the computational model.