

WORKGROUP FOR MULTIPHASE FLOWS

Development of models and database for studies of erosion in gas-solid flows by using experiment and numerical techniques

Grant number

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Project title

Development of models and database for studies of erosion in gas-solid flows by using experiment and numerical techniques

Projekt leader

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gas-solid, multiphase flows, OpenFOAM, FASTEST/Lag3D

Short description of the Project

Gas-solid multiphase flows are present in several industrial processes such as pneumatic conveying, cyclones, fluidized beds, and risers among others. One of the main industrial problems related to this kind of flow is the erosion caused by the impact of solid particles to the walls of the equipment. This phenomenon can lead to partial or complete deterioration of equipment or pipes resulting in high costs for industries due to maintenance or replacement of the damaged equipment. The primary objective of this research project is to develop and validate a new mathematical model to predict the erosion caused by spherical and non-spherical particles. Impact velocity, impact angle, shape of particles as well as mechanical properties of particles and walls are the most important parameters to be considered in the modelling of erosion phenomena. In order to analyze the erosion in a bend, numerical simulations considering the new erosion model are being carried out using two open source codes (i.e. OpenFOAM® and FASTEST/Lag3D) that are based on the Euler-Lagrange approach. The CFD codes also take into account the stochastic particle-wall and stochastic inter-particle collisions. Particle-wall collision experiments are being conducted to measure the impact-rebound velocity and angle in which impact parameters, e.g. the coefficient of restitution and friction, can be determined. Physical experiments considering spherical and non-spherical particles using a pneumatic conveying facility are being performed for verification and validation of the new erosion model. The main result of this research intends to bring a better comprehension and representation of the erosion phenomena and strategies to prevent this issue.

