

عنوان مقاله:

Study on the Impact Wear Characteristics of Catalyst Particles at 90° Elbow via CFD-DEM Coupling Method

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خلاصه مقاله:

In the process of petrochemical production, the catalyst particles in the hydraulic conveying pipeline often cause wear failure accidents due to collisions with wall. Compared with spherical particles, non-spherical particles' trajectory would be different due to its geometric shape, and thereby affecting the flow wear characteristics. In this paper, the shape of catalyst particle model with real aspect ratio was constructed by using multi-cluster method, and a CFD-DEM coupling method was adopted by considering the interaction between particle-particle and particle-wall. The study focuses on the effect of particle shape, radius of curvature and angle of bend in terms of the wear characteristics of liquid-solid two-phase flow. The results indicate that with the increase of the particle aspect ratio, the wear rate and the impact density of particles decrease while the impact velocity increases, the wear area of the elbow mainly distributes in the middle part of the outer wall, and its maximum position appears between 78° and 90° in polar coordinates; With the increase of pipe's curvature radius, the main wear area changes due to the direct collision and the sliding friction of the particles along the pipe wall, and its maximum wear rate shows a downward trend due to the reinforce of buffering effect; With the decrease of bending angle, The main wear area decrease because of the changes in particle flow patterns and it is mainly located in the center of the outer wall

کلمات کلیدی:

Catalyst particles, CFD-DEM, Liquid-solid flow, Non-spherical particles, Numerical simulation

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