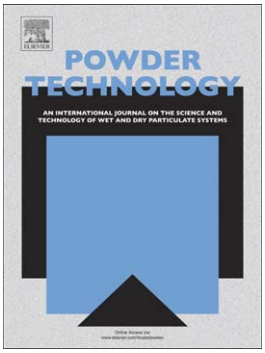

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Abstract

Gas-solid fluidized beds with the presence of a few liquid are applied widely in industry, while agglomeration and poor fluidization could happen as a result of inter-particle cohesiveness. In this paper, a hysteresis contact model is applied to consider energy dissipation resulted from both lubrication and liquid bridge during wet particle collision. The model can predict the particle rebound and adhesion behaviors, under influence of collision velocity, liquid content, liquid viscosity and surface tension. The fluidization characteristics of the wet particles under different conditions in a 2D fluidized bed are simulated and compared. Generally, it is found that with the presence of liquid, the particles begin to be agglomerated and the bubbles become gas channels. By increasing the cohesiveness, the fluctuation of pressure increases first and then decreases, the fluctuation of particle velocity decreases generally and the probability density of particle velocity around zero increases. When the cohesiveness is increased further, the internal recirculation of wet particles is restrained and the gas channels become stable.

Keywords: Hysteresis Contact Model; Discrete Element Model; Agglomerate; Adhesion

1. Introduction