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Experimental investigation of an internally circulating fluidized bed with 32-electrode Electrical Capacitance Volume Tomography

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- A 32-electrode ECVT system was developed for 3-D imaging.
- The inner 3-D ECVT image of the whole bed was reconstructed.
- The fluidization characteristics with different U_f and U_m were investigated experimentally.
- The ECVT image of ICFB was compared with the existing numerical simulation.

Abstract

32-electrode electrical capacitance volume tomography (ECVT) was initially developed to investigate the inner flow characteristics of the internally circulating fluidized bed (ICFB) with baffle. The electrodes of the 32-electrode ECVT sensor were arranged based on their structure and dimension. The sensor characteristic was explored using the Finite Element Method. Additionally, a data acquisition system with 32-channel capacitance measuring units was also developed. The imaging speed of the 32-electrode ECVT system is 130 frames/s. Simultaneously, the experimental rig for the ICFB with baffle was constructed to investigate the characteristics of particle flow under different fluidizing gas velocities. The experimental results were then compared with the reported numerical simulations of ICFB.

Keywords: Internally circulating fluidized bed; Electrical capacitance volume tomography; Baffle; Gas/solid flow; Bubble

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