The structural optimization of gas-solid baffles on the cross-flow moving bed

Ruo Jin Wang[1], Dewu Wang[1], Fan Yiping[2], Chunxi Lu[3], Yan Liu[1], Baisong Hu[1], Shaofeng Zhang[1], Meng Tang[1], and Yishuo Zhang[1]

[1]Hebei University of Technology
[2]China University of Petroleum
[3]China University of Petroleum Beijing

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Abstract

In the cross-flow moving bed, the gas-solid cross-flow pattern facilitates its high gas process capacity under relatively low pressure drop. In this paper, a structural optimization of gas-solid baffles, is proposed to enhance the bed operating flexibility by controlling the abnormal phenomena of cavity, pinning and air lock. According to experimental data, the relevant equations for predicting the occurrence of the abnormal phenomena are derived to explain the effects of the gas-solid baffles. It turns out that, with this proposed optimization, the cavity and pinning are weakened in both rectangular and radial beds; the air lock can be easily controlled by increasing the height and diameter of feed tube. The preferred gas-solid baffles is in the middle position (x/L=0.5) of the rectangular bed and/or (r-r1)/(r2-r1)<0.5 of the radial bed under different gas superficial velocities, particle diameters and bed voidages.

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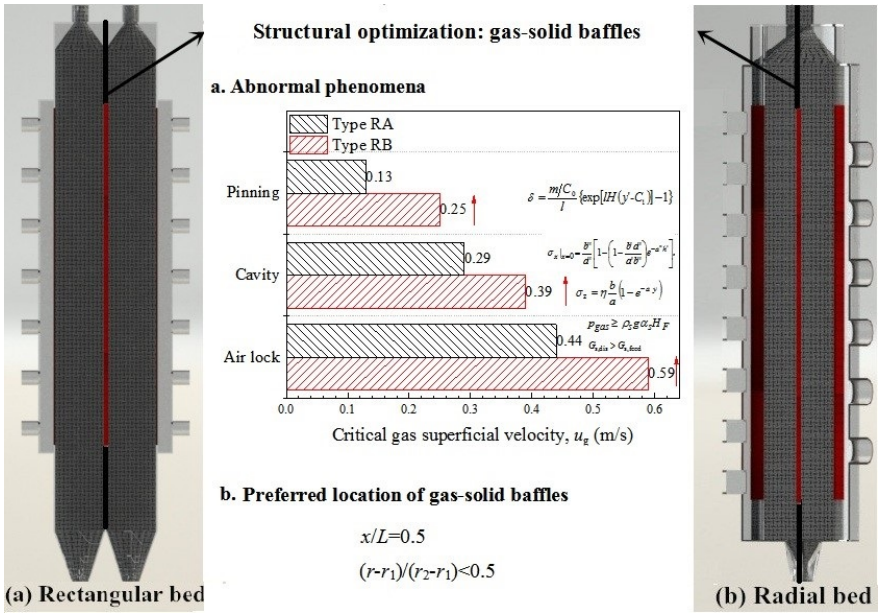
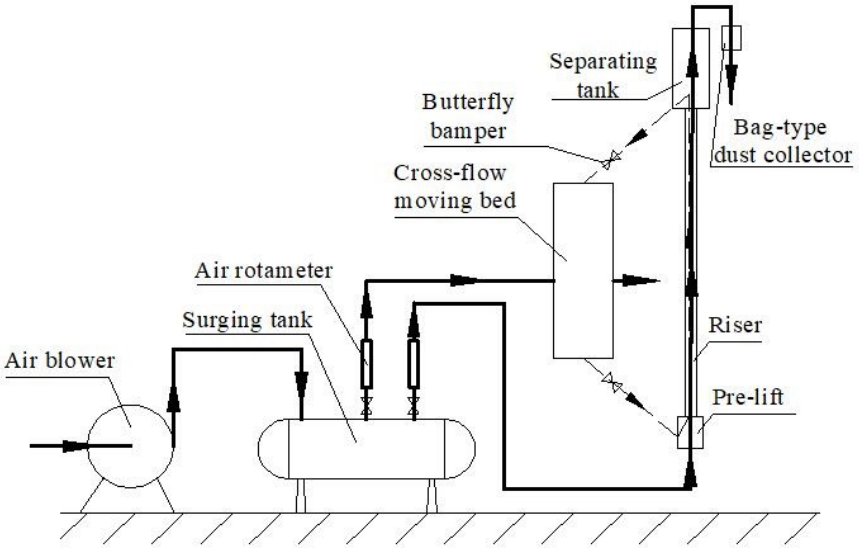
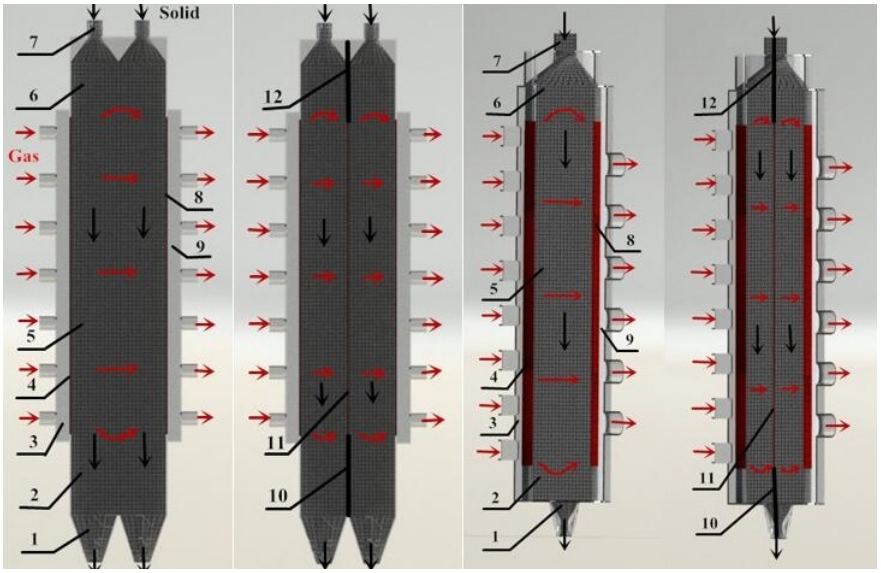
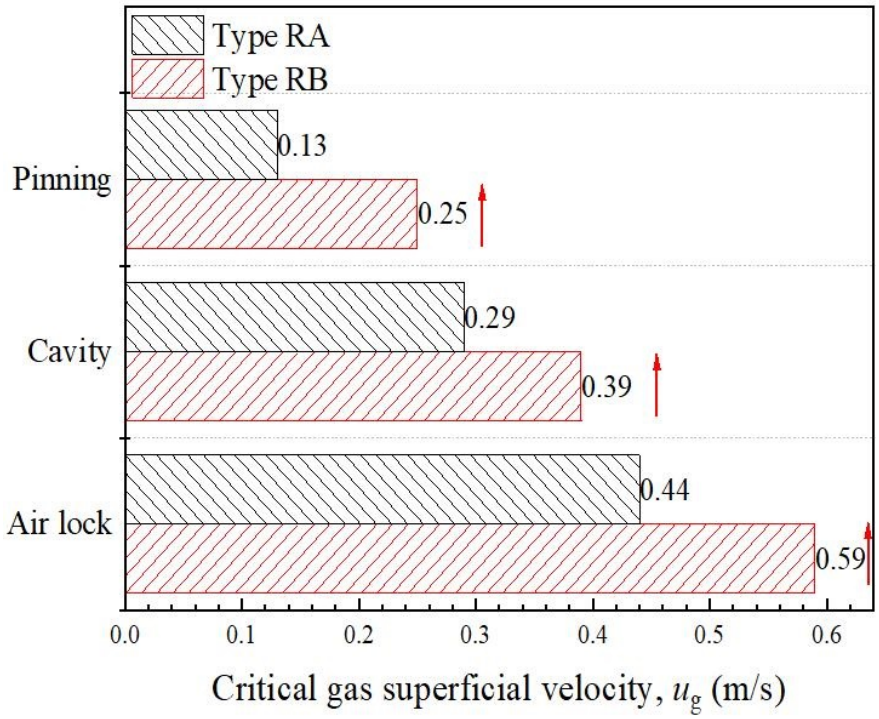
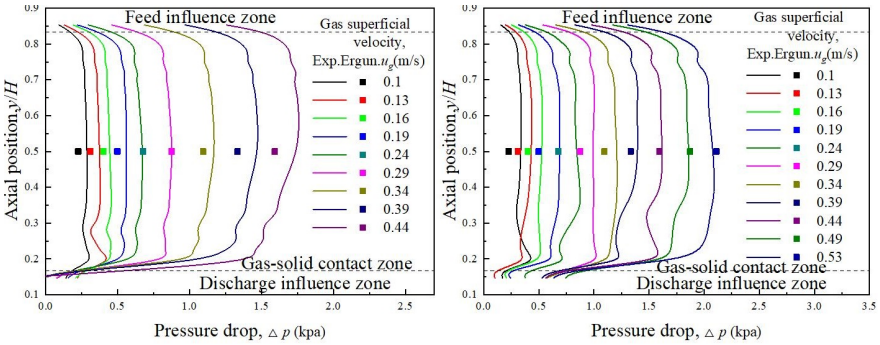


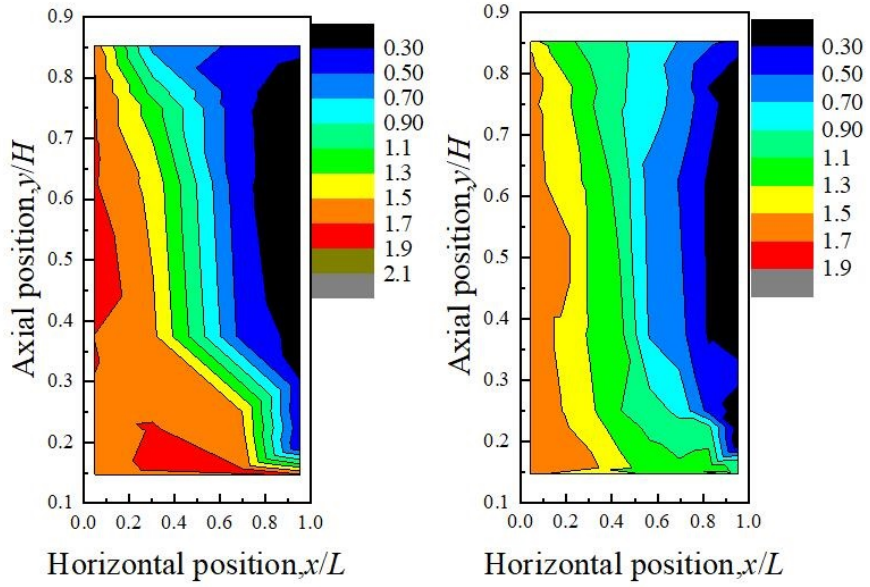




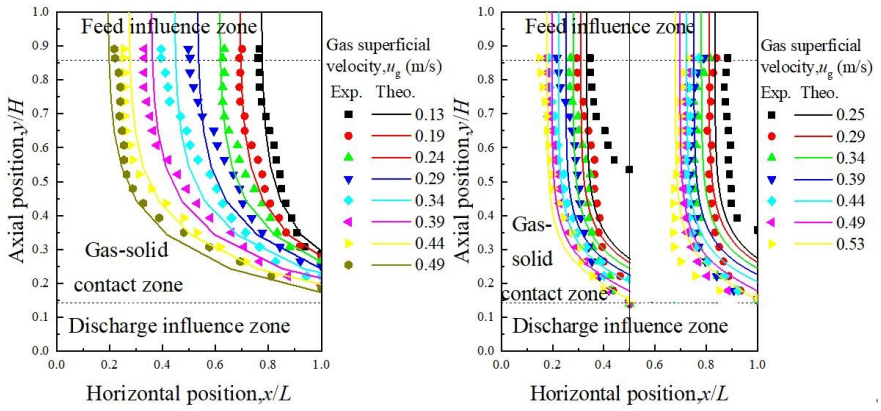




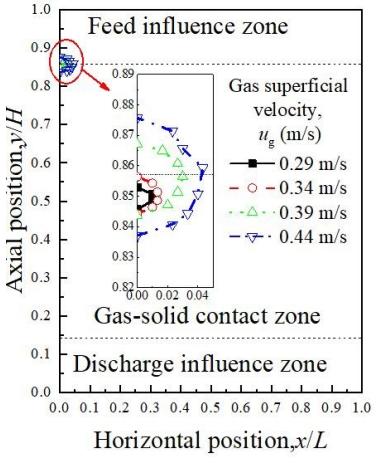
(a) Original bed (type A) (b) Bed with gas-solid baffles (type B)



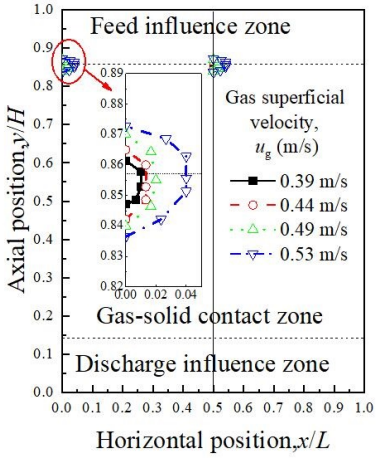
(a) original bed (type RA) (b) bed with gas-solid baffles (type RB)



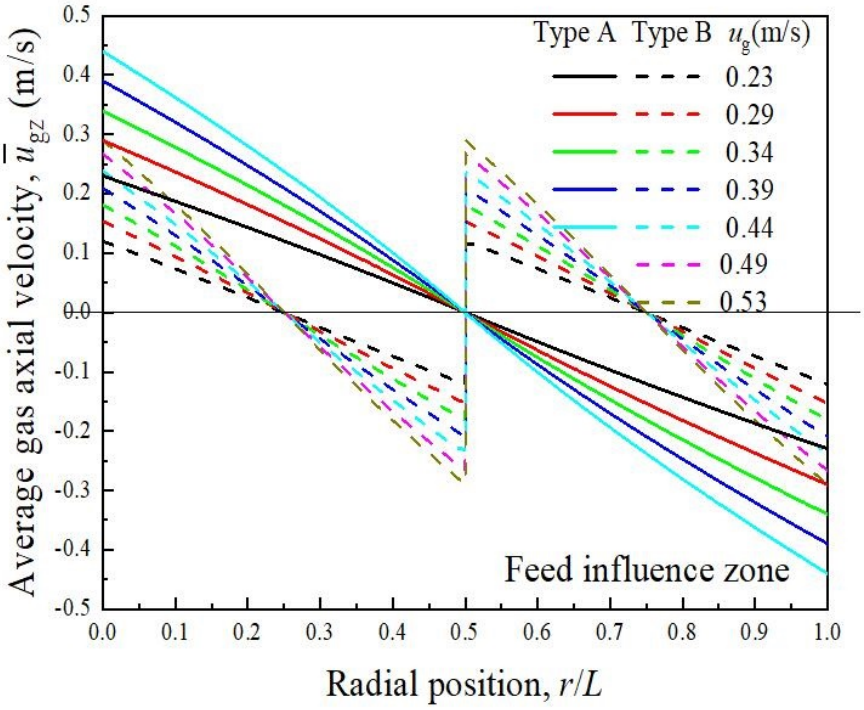
(a) original bed (type RA) (b) bed with gas-solid baffles (type RB)

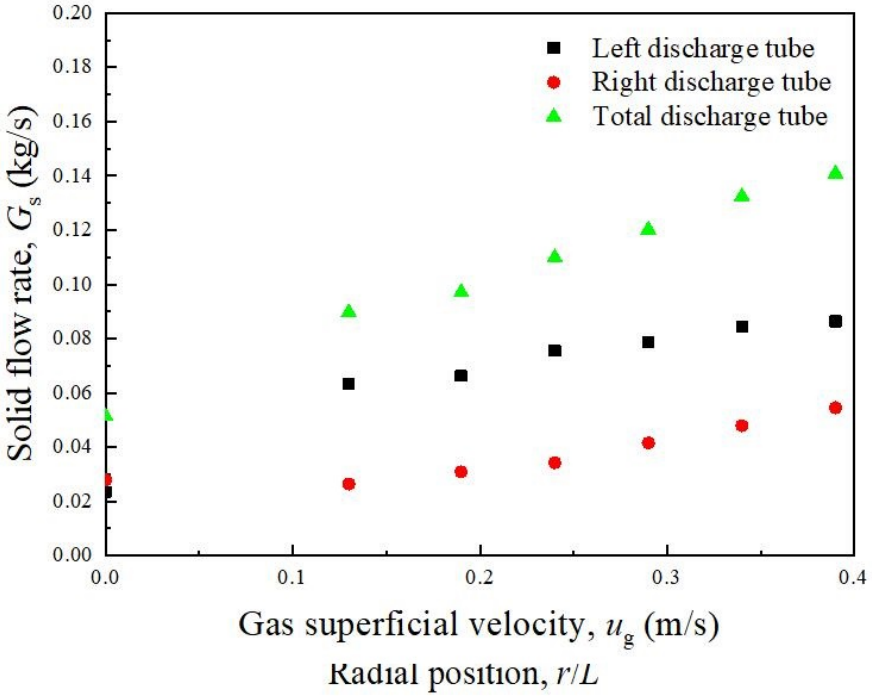


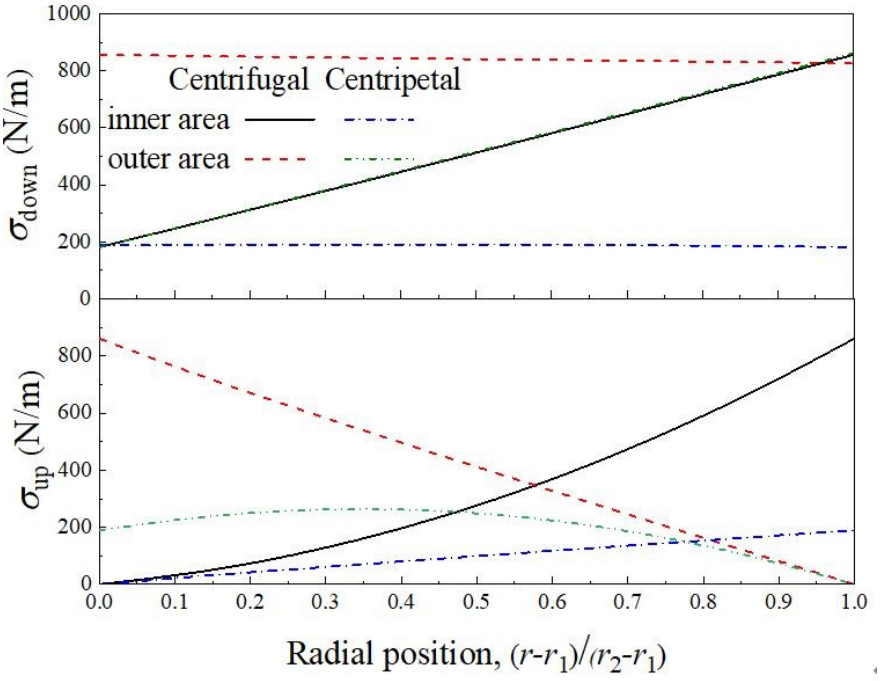
(a) original bed (type RA)



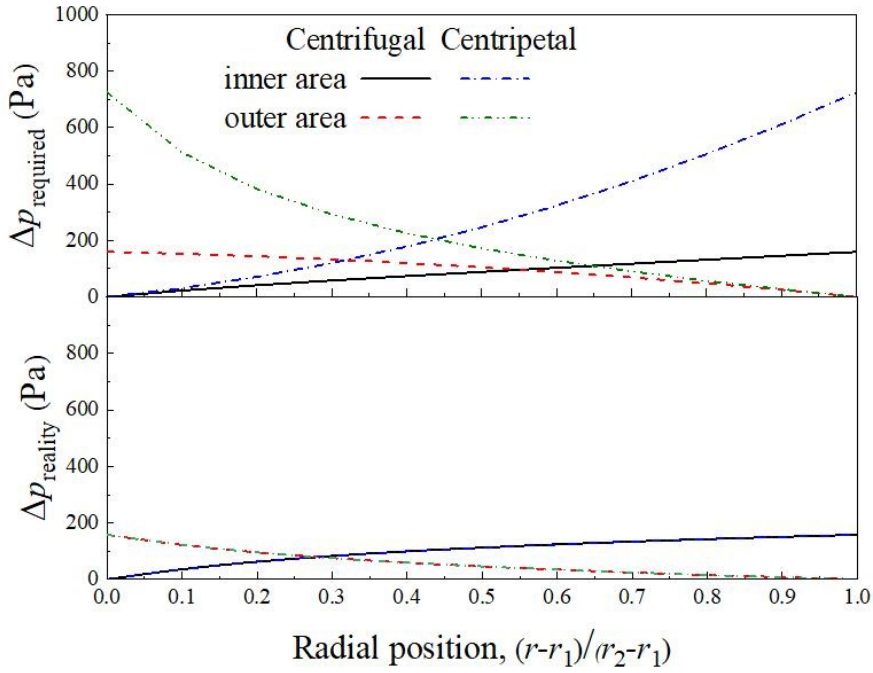
(b) bed with gas-solid baffles (type RB)

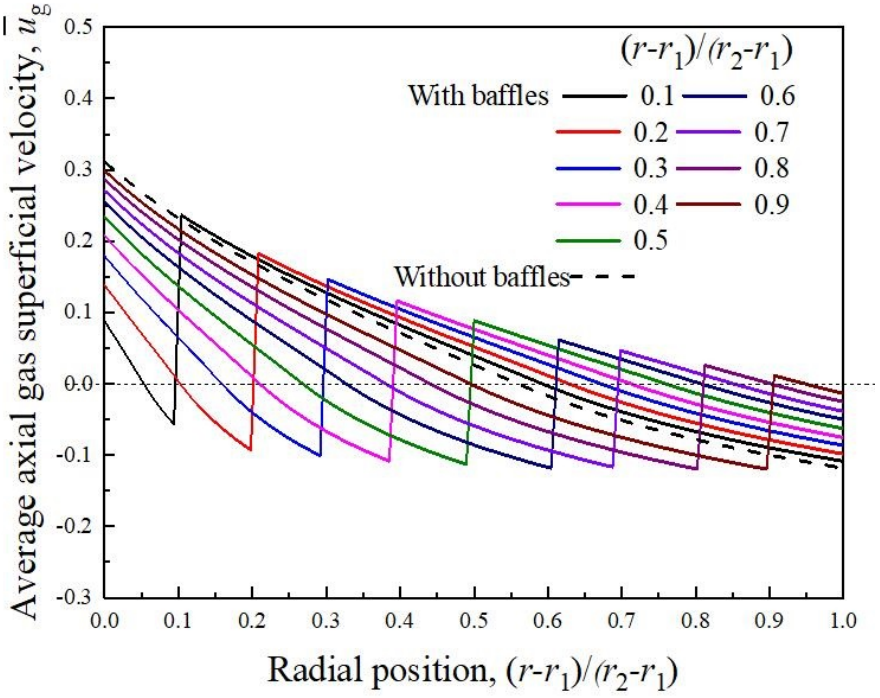


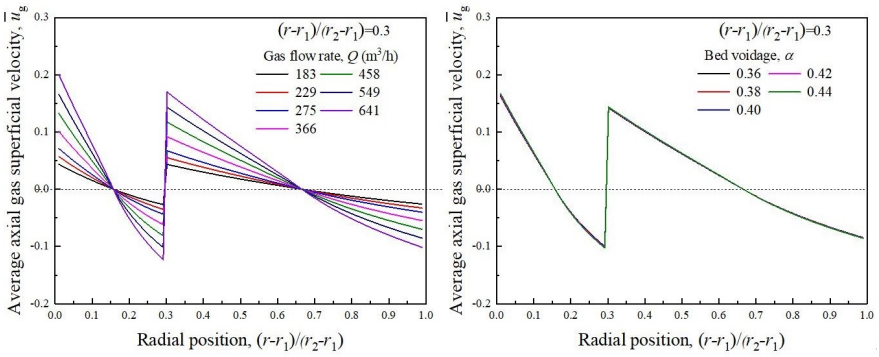




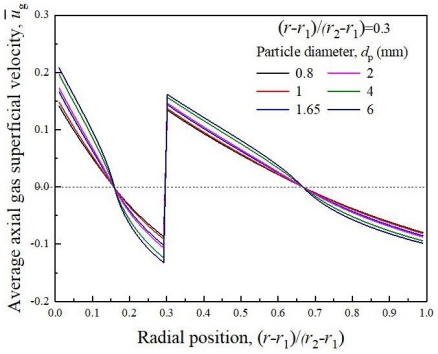
Radial position, r/L







(a) Gas flow rate (b) Bed voidage



(c) Particle diameter