Numerical Study for Segregation Characteristics of Char in a Fluidized Bed varying Column Shapes

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In the present study, computational particle fluid dynamic (CPFD) was applied to investigate the segregation characteristics of char in a fluidized bed column. The aspect ratio of the fluidized bed column was changed and the effect of the bed column shape on the segregation characteristics of the materials were investigated by varying the superficial gas velocity. The segregation of the materials was analyzed in terms of the char mass fraction and segregation index. The different column shapes are devised to change the bubble size, which influence on the particle segregation. The bubble size decreases as the aspect ratio of the fluidized bed column increases. Smaller bubble size has a positive effect on segregation and removal of the char layer formed during the fast pyrolysis of biomass because the fluidization is carried in the vigorous bubbling regime. The CPFD simulation results can be applied to rapid char separation in fast pyrolysis process, which may result in the increase of bio-oil yield to prevent the second cracking of volatiles.