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Numerical simulation of ash particle deposition characteristics on the granular surface of a randomly packed granular filter

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Abstract

In this paper, a randomly packed granular filtration model was built to investigate the mechanism of particle deposition on the granular surface, including the deposition positions, the backflow of particles and the relation with Stokes number. The deposition positions of particles of different size on the granular surface were exhibited, and the results showed that the diameters of particles deposited on the leeward side of the granule are smaller than $5\mu\text{m}$. The deposition area is larger and more uniform for smaller particle deposited on the windward side of the granule and it leads to a higher pressure drop. Besides, the concentrations of particles smaller than $5\mu\text{m}$ linearly decrease with the height of the model between 50mm~78mm, and for the cases of larger than $15\mu\text{m}$, they dramatically drop between 50mm~63mm and the decline rate gradually reduces to zero with respect to 78mm. Other cases of particle diameters between $5\mu\text{m}$ ~ $15\mu\text{m}$ are between the above two situations. The Stokes number based on the inlet gas velocity *versus* the grade collection efficiency and the Stokes number based on the normal

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