Gas-solid CFD model of cyclone with different particle sizes

김지윤[1,2], 임영일[1,2,†]
[1]CoSPE, Department of Chemical Engineering; [2]Hankyong National University
(limyi@hknu.ac.kr†)

The gas-solid Eulerian-Eulerian computational fluid dynamics (CFD) model was developed for the cyclone seperators. The separation efficiency of particles inside the cyclone separator was investigated according to different inlet particle sizes using CFD model. The renormalization group (RNG) k-ε was used for the turbulent flow. The particle trajectories were calculated via a five-phase Eulerian approach The total separation efficiency of different inlet particle sizes was 99%. The partial separation efficiency of the smallest particle size (10㎛) was 95%. The simulation confirmed the applicability of CFD modeling with the RNG k-ε model to identify the effect of particle size on the separation efficiency of the cyclone. The Eulerian approach will be compared with the discrete phase model (DPM). The CFD model has potential to optimize the cyclone structure.

Keywords: Cyclone, Separation efficiency, Computational fluid dynamics (CFD), Eulerian approach, Discrete phase model (DPM).