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Experimental and CFD Study on the Effects of Surface Roughness on Cyclone Performance

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ABSTRACT

Surface roughness is a highly practical parameter during the manufacture and operation of cyclone separators, but is not often researched. This study was carried out to investigate the effects of surface roughness on flow field and cyclone performance numerically and experimentally. The simulated pressure drops were in good agreement with the experimental data. The results also showed that surface roughness considerably influences the velocity distribution, boundary layer thickness, natural vortex length, separation efficiency, and pressure drop in the separator. The maximum separation efficiency related to surface roughness was revealed, as well. These results may provide a workable reference for the effects of surface roughness on the flow field and corresponding separation performance in cyclone separators.

Keywords: Cyclone separator; Surface roughness; Separation efficiency; Pressure drop; Flow field

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