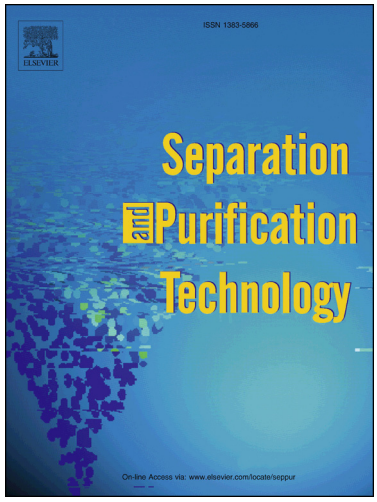

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Influence of a Laminarizer at the Inlet on the Classification Performance of a Cyclone Separator

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Abstract

A laminarizer consisting of a bank of 15 tubes was assembled at the entrance of a cyclone. Experiments and numerical simulations were performed to examine the influence of the laminarizer on the pressure drop across the cyclone, partial separation efficiency, gas tangential velocity distribution, particle distribution at the entrance, and 50% cut size. Using the laminarizer slightly increased the pressure drop across the cyclone and slightly reduced the gas tangential velocity. The laminarizer altered the air mass flow rate and particle flow distribution at the entrance. It increased the air mass flow rate through the outer part of the entrance. At an inlet gas velocity of 11 m/s, installing the laminarizer reduced the number of particles flowing through the inner part of the entrance by 20.2%. Higher particle concentrations were found at the outer part of the entrance, where the particles were more easily captured after entering the main body. At an inlet gas velocity of 11 m/s, using the laminarizer increased the pressure drop across the cyclone by 8.1% and reduced the 50% cut size of the cyclone from 2.04 μm to 1.89 μm.

Keywords: Cyclone; Laminarizer; Computation fluid dynamics; Partial separation efficiency; Pressure drop

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