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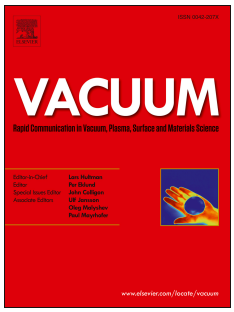

Numerical and experimental studies on transport properties of powder ejector based on double venturi effect

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PII: S0042-207X(16)30238-X

DOI: 10.1016/j.vacuum.2016.10.007

Reference: VAC 7154

To appear in: *Vacuum*

Received Date: 12 July 2016

Revised Date: 3 September 2016

Accepted Date: 5 October 2016

Please cite this article as: Xu J, Liu X, Pang M, Numerical and experimental studies on transport properties of powder ejector based on double venturi effect, *Vaccum* (2016), doi: 10.1016/j.vacuum.2016.10.007.

Numerical and experimental studies on transport properties of powder ejector based on double venturi effect

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Abstract： The venturi ejector can form vacuum fields to transport particles due to venturi effect. The transportation performance of powder ejectors based on single- and double- venturi effect and the influence of nozzle position on the transportation performance were respectively investigated by the experimental method and the numerical simulation based on the CFD-DEM coupling method. The present results show the wind speed of the particle inlet increases due to the double-venturi effect, which is beneficial for particles into the injector; the driving force exerting on particles by fluid increases, meaning that particles can be transported to a long distance; the closer the nozzle is to the export, the greater the wind speed of the particle inlet is and the greater the suction force exerting on particles is; the closer the nozzle is to the export, the less the deposition number of particles in the injector is; however, particles can be hindered into the venturi tube if the nozzle is very close to the export. Additionally, in order to reduce the particle deposition, the optimal solution is presented here, namely, the nozzle position away from the export, y^*=30 mm.

Keywords： double-venturi effect; CFD-DEM coupling; powder conveying; nozzle position

1 Introduction

Pneumatic conveying technology has many merits, such as flexible layout, no dust pollution, low operation cost and simple maintenance [1-3]. Thus, pneumatic conveying technology is widely used to petroleum, chemical, metallurgical, pharmaceutical, food and mineral processing industries. Venturi powder ejector is the gas-solid one based on the venturi effect. Some experimental and