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EFFECT OF THE LOCATION OF A GAS FLOW CONTROL ELEMENT IN AN EJECTOR UNIT ON THE FLOW PATTERN

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This article is devoted to a numerical simulation of the flow in a jet mill ejector equipped with a gas flow control element. This element is a channel wherefrom an additional gas flow enters the accelerating tube of the ejector. The gas flows in the mill ejector are controlled using the energy of additional gas flows, thus increasing the velocity of the main flow at the outlet of the ejector accelerating tube and producing a protective layer around the tube walls to prevent their wear. At the same time, there is no substantiation for the choice of optimal control parameters, a methodology, or scientific methods for gas flow control in the ejector channels. The purpose of this work is to investigate the effect of the location of the gas flow control element on gas-dynamic ejector performance and the flow pattern in the ejector channels. A numerical study was carried out using the Ansys Fluent software package and the SST k- ω turbulence model. In the course of the study, the pressure of the additional gas flow and the distance from the accelerating tube inlet to the energy carrier supply channel were varied. The angle of the additional gas flow was 20°. The numerical simulation gave flow patterns in the ejector as a function of the location of the gas flow control element. Streamlines of the additional gas flow were constructed. The article presents the average flow velocity at the accelerating tube outlet and the energy carrier flow rate as a function of the pressure of the additional flow of the energy carrier and the location of the gas flow control element and the maximum values of the average outlet velocity for given pressure ranges. The article substantiates the choice of the gas flow control parameters that maximize the velocity of the mixed flow at the accelerating tube outlet at a minimum gas flow rate. The results may be used in improving material processing technologies.

Keywords: control elements, ejector unit, numerical simulation, additional gas flow.

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