

# **Aerodynamic Properties of Particles in the Gravitational Flow of a Chuted Bulk Material**

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## **ABSTRACT**

Chutes are a linking element of transportation lines used for transfers of reprocessed materials from one transporting group or equipment to another.

The mode of the chuted material motion and the nature of the associated aerodynamic processes are determined by the aggregate physical and mechanical properties of the material being transferred and structural design of chutes [1-3].

Structurally chutes are subdivided into prismatic, cylindrical and pyramid-shaped (bin) chutes by shape and into vertical, tip and kinked chutes by the bottom slope angle.

The most common in practice are tip chutes of a prismatic or a pyramid shape.

The purpose of this work was the study of particle movement of granular materials in the sloping chute. In the result of the research, we revealed the following.

By its physical and mechanical properties, a bulk material stream in chutes features the unbound mode of accelerated motion with exponential distribution of particles by the channel cross-section depth which significantly changes the conditions for the dynamic intercomponent interaction, heat and mass exchange as compared to physically one-dimensional models. By the particles distribution streams may be divided into two classes: streams featuring pseudo-uniform distribution of particles when a saltating motion of particles with a light concentration gradient prevails and streams featuring a laminar motion when the most portion of particles colliding each other is at the chute bottom and a small portion of saltating particles is above the layer of particles with a heavy concentration gradient.

## **REFERENCES**

- [1] I.N. Logachev and K.I. Logachev, *Industrial Air Quality And Ventilation: Controlling Dust Emissions*, 1<sup>th</sup> Edition, CRC Press, 2014.
- [2] I.N. Logachev, K.I. Logachev and O.A. Averkova, "Ejection of air by the stream of bulk materials in a vertical perforated channel", *Proceedings of the III International Conference on Particle-based Methods. Fundamentals and Applications (Particles 2013)*, 103-114 (2013).
- [3] I.N. Logachev, K.I. Logachev and O.A. Averkova. "Basic regularities of ejection air by flow of freely falling particles", *Proceedings of the III International Conference on Particle-based Methods. Fundamentals and Applications (Particles 2013)*, 91-102(2013).