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THE PRECONDITIONS FOR THE IMPLEMENTATION AND THE CHOICE OF TECHNIQUE PROCESS FOR UNLOADING OF CUTTINGS FROM THE HOPPER

There are disadvantages existing of granular materials. First of all, it is significant damage of the assembled product and the formation of the statically stable pickups. Second of all, increased speed of unload material with different physical and mechanical properties, etc. is the unsolved part of the research on machine productivity. One of the main obstacles in solving of this problem is the complexity of bridging.

Having analyzed the existing theories that reflect the essence of bridging, we may conclude that the majority of them describes the behavior of the material itself, but offers no solutions to the problems. In addition, since material properties vary greatly, it is obvious that there are no common approaches to solving the problems of bridging.

The scientists distinguish two main areas to ensure smooth unloading of bulk cargo from tanks:

1. To prevent bridging that can be achieved by proper choice of parameters of capacity;
2. To destroy the formed arches with the help of different bridging devices.

Both directions are up-to-date ones. But the most progressive is the first one. It is better to prevent bridging, than to deal with it. The simulation of particle motion of loose material being unloaded, as well as the choice of means for the destruction of the bridging formed in the tank depend on the physical and mechanical properties of the material and the tank capacity.

Let us assume that the layer of cuttings consists of circular cylinders with b length, $\overline{\rho}$ density and a radius. An example of such a material is cutting. This issue is an up-to-date one due to increased popularity of fuel on the basis of bioenergy crops and, consequently, the need in fast and efficient machines to create so called energy plantations [1-4]. One of the most common crops is energy osier. The osier is planted by vegetative way with the help of cutting 20-25 cm long and 8-20 mm in diameter (graph 1).

On the basis of research, we can conclude that during the pouring out of such bodies the issues connected with the position of cuttings in the longitudinal and transverse planes arise. However, the selection of parameters of an unloading device guaranties even and continuous motion of the material. To explore the process and build a mathematical model of movement of material it is important to determine the physical essence of a set of cuttings and determine the corresponding theory for describing her movements.

Graph1: Energy willow planting material

The process of unloading from the tank could be designed on the basis of methods for hydrodynamics of multiphase systems [5-6]. According to this approach the total number cuttings that is influenced by the gravitational field and seismic fluctuations is modeled by a two-phase structure. This structure consists of discrete components (a set of cuttings) and continuous components (gaseous medium). These components in terms of mechanism of multiphase systems are treated as solid mediums.

These mediums are characterized by two effective coefficients of the viscosity caused by the interaction between cuttings and the interaction of cuttings with gaseous medium (air). We suppose that the bulk concentration of (discrete component) is bigger than similar values for continuous components. In this case the viscosity that is associated with the interaction with gas medium can be neglected. Therefore, the movement of discrete components can be designed as a movement of viscous incompressible pseudoliquid. The field rate of this pseudoliquid must satisfy Navier-Stokes equation [7-9].

The solution of this equation in the linear approximation is a mathematical process model of pouring out the cuttings from the hopper.

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