IDENTIFICATION OF DYNAMIC MODE OF HEATING AND DRYING THE GRAIN INFRARED RADIATION

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The tasks of improving the quality of grain products subject to dehydration, need further improvement drying processes both in technological and energy plan. Traditionally drying is carried out mainly in units of convective heat supply method. In the literature observed promising application of infrared radiation in the processing plant production and preparation for storage. To do this frequently used settings periodic operation. Infrared drying processes in the walk-through installations studied enough.

The purpose of research - to improve the mathematical description of the processes of heat treatment and drying zernomaterialiv infrared light and practical identification models.

Materials and methods research. Specificity of the object determines the feasibility of using the analytical method as basic research. In the first stage on the basis of information received about the physical features of the mathematical model is formulated, and the system of equations are analytical expressions for the dynamic characteristics of the process. In the second phase experiments are being conducted to determine the transition process (heating and drying kinetics material). In the third stage the experimentally obtained data determined coefficients of differential equations. A mathematical model should meet the following requirements:

- Only play the phenomena that make a significant contribution to heat transfer and mass;

- Equation must have the minimum number of variables that should be determined experimentally.

Results. Drying considered as process heat. The basis of his mathematical description of the assigned value for the heat balance, recorded as a system of differential equations in partial derivatives.

In deriving the differential equations describing the process of heating grains in a moving bed, made the following assumptions:

- Heaters and screen is taken as one container of equivalent heat capacity;

- Specific heat grains and radiator, heat transfer coefficients between grain air radiator elements and structures do not depend on the temperature and time does not change;

- Temperature radiator in length does not change;

- Heating the grain bezhradiyentnyy;

- Moisture removal rate is proportional to the heating rate and have different signs:

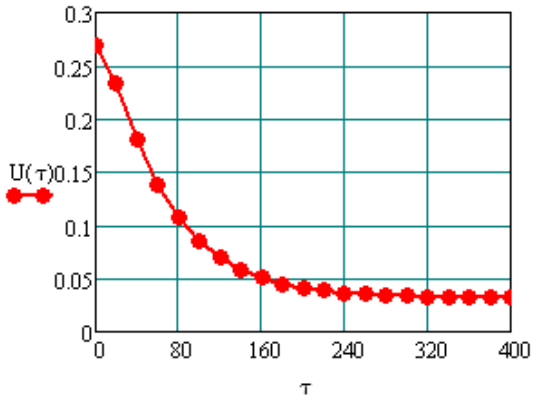
Given the assumptions made dynamic heating grains in a moving layer with infrared irradiation can be described by a system of two differential equations /

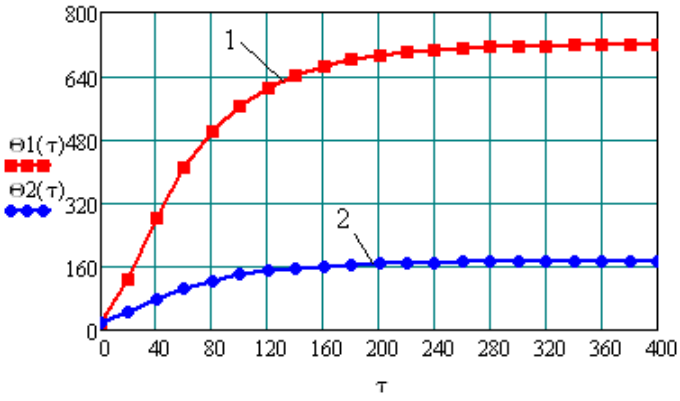
For grain moisture content equation changes when heated infrared radiation use defined criteria Rebinder.

Realization of the solution was performed in a mathematical environment Mathcad 14 via built-genfit. Drying kinetics identified by determining the number of integral Rebinder effectively by the number of removed moisture.

The results of identification of dynamic modes infrared heating and drying grain shown in Figure curves in a transition process.

From the above mentioned follows that tested very effective approach to parameter identification process heat treatment zernomaterialiv that solves the problem of determining the dynamic characteristics of the two vessels - meter and grains in the presence of experimental data on the transition process one of them.





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Changing the parameters of grain on time:

a - the moisture content of the grain U (τ), kg / kg • s.r .;

b - emitter temperature Θ1 (τ) (1) and grain Θ2 (τ) (2) degrees respectively

Conclusions

Analytical dependences of temperature change and emitter material over time that allow based on experimentally determined curve heating radiator determine the dynamics of changes in temperature and moisture content of moving grain layer materials.