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ACTUAL PROBLEMS OF RENEWABLE ENERGY, CONSTRUCTION AND ENVIRONMENTAL ENGINEERING

The time and place of the meeting: 3 – 5 June 2021
Faculty of Environmental, Geomatic and Energy Engineering,
Kielce University of Technology, Poland
al. Tysiąclecia Państwa Polskiego 7, 25-314 Kielce

Conference Chairs:

Anatoliy Pavlenko
prof. doctor of science Department of Building Physics and Renewable Energy, Kielce University of Technology

Aleksander Szkarowski
prof. doctor of science Head of Department of Construction Networks and Systems, Koszalin University of Technology

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DETERMINATION OF THE TEMPERATURE CONDUCTIVITY COEFFICIENCY OF BULK BIOFUELS

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Abstract: The article presents the results of the experimental determination of the temperature conductivity coefficient of bulk fuel of plant origin. Solid bulk materials formed by solid and gas phases are widely used in human economic activities. The quality indicators of heterogeneous materials and products made from them are often determined by heat transfer modes, which depend on thermophysical properties: thermal conductivity, heat capacity, thermal diffusivity. These properties are functions of the properties of its solid and gas phases, pore volume or space between solid particles and the specific volume of the solid phase, etc. This leads to a significant effect on the thermophysical properties of mechanical, thermal and physicochemical effects that materials are exposed to during operation. Therefore, the solution of the problems of developing calculation methods and experimental determination of the properties of heterogeneous materials, taking into account their structural characteristics, is of particular relevance. Thus, the problem of controlling the thermophysical properties of heterogeneous materials which are formed by solid and gas phases, and which are subject to mechanical, thermal, physicochemical effects during operation, is of current interest. The paper presents a method for measuring thermophysical properties based on the use of a regular regime of the first kind at various stages of the measurement process.

Key words: flowability, temperature conductivity, a-calorimeter, cooling rate.

Introduction

Bulk materials can be found in nature, in industry and in everyday life. Despite its wide distribution, bulk materials are still the object of study.

While developing and designing equipment, used for pressing bulk fuel, some difficulties often arise due to the lack of reliable information on the thermodynamic properties of the bulk medium. Available in the literature information on thermodynamic properties is limited and does not allow interprete the obtained patterns for other systems. The possibilities of theoretical calculation methods are extremely limited and only provide qualitative information on the properties of bulk solids.

The process of compression of bulk material in a closed volume of the working body leads to an increase in density, thermal conductivity, and this leads to the changes in the physical and mechanical properties of the medium.

The subject of research is raw materials for the production of solid biofuels (sunflower husk, buckwheat and barley husk, sawdust.

The optimal temperature regime is one of the most important stages in a rational technology for the production of pellets and briquettes, since depending on the selected mode, one can get a product with a certain range of properties.

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