

E.V. Malaya  
N.V. Livitan, research supervisor  
I. P. Nikitina, language advisor  
National Metallurgical Academy of Ukraine, Dnepropetrovsk

## **Research of Processes in Granular Environments**

The main questions connected with a fluidized layer that interests technologists are questions of determination of effective heat conductivity in a layer and heat exchange characteristics in a fluidized layer with the body shipped in it or walls limiting a layer. Mass-exchanged parameters of chemical reactions are also interesting.

The coefficient of effective heat conductivity in a layer of disperse material characterizes property that layer to carry out a thermal stream only at insignificant differences of temperatures in various points of a layer. In the majority researches of transfer the warmth from a wall to gas or liquid through a granular layer is accepted that Effective heat conductivity on all thickness of a layer remains approximately identical.

The measurement made in laboratories has showed that effective heat conductivity of a layer in the horizontal direction is order of magnitude higher, than in the vertical. Effective heat conductivity in the vertical direction reaches 30000 - 45000 kcal/m hour. For example, heat conductivity of silver is 100 times higher.

Effective heat conductivity of a layer depends on many variables: the size, forms of orientation and reported capillary channels, a form and the size of a covering particles, thermal contact of particles, a material and thickness of a covering, a layer volume and superficial porosity. Besides, it depends on thermal-physical properties of boiling liquid, regime parameters, and consequently, on steam content in a porous layer and the hydrodynamic effects connected with movement and evaporation of a film of superheated liquid in bubbles.

Intensive hashing of firm particles causes high effective heat conductivity of a boiling layer. Heat transfer in it is carried out, mainly, by the particles heating up or being cooled at a heat exchange surface and moving in a layer.

Energy transfer by radiation as it is known plays large role in effective heat conductivity of a motionless high-temperature layer. So, in heat exchange of a high-temperature fluidized layer with the body shipped in it or limiting walls the radiant component can be essential if temperature of a layer or a surface is rather high. But the role of energy transfer by radiation in developed fluidized layer is minimum.

Devices of a boiling layer are used wide for thermal treatment of a granular layer. Effective heat conductivity of a layer-catalyst in hundreds times more, than motionless when grains are hashing. The temperature mode is close to isothermal.

The most perspective direction in modern equipment of a boiling layer is creation of high-temperature fluidized systems.