

The erection and protection of an inhabited station on the surface of the Moon

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Abstract

Results of the researches devoted to a problem of construction and protection of the manned station on the surface of the Moon are presented in this article.

In work the possibility of use of lunar soil for production of construction ceramic blocks for the purpose of construction of a protective building construction – a lancet dome in which the lunar manned station will be placed was for the first time estimated. The samples made of furnace charge of the baked terrestrial basalt of the Gaysky field (Yu. Ural) imitating lunar soil were exposed to a research. Agglomeration of samples was carried out in the muffle and microwave furnaces at temperatures of 1000-1250 °C.

By means of a method of mathematical planning of an experiment influence of parameters of process of production of ceramic samples on their properties was studied. As criterion of optimization the strength of blocks at compression has been chosen, and as independent variables – temperature of agglomeration and specific pressure of their pressing.

The conducted researches have revealed optimum conditions of production of samples of ceramic block products from material simulator of lunar soil – regolith: roasting temperature – 1100-1150 °C, the specific pressure of pressing of blocks – 124 MPa, strength – 130 MPa. Durability on compression of prototypes exceeds durability of terrestrial wall construction materials almost six times.

Results of researches have confirmed a possibility of use of microwave for production of block products from basalt furnace charge that is quite acceptable in the conditions of the Moon.

As a result of researches it is shown that the simulator of lunar soil – mix of four fractions of the crushed terrestrial basalt with success can be used for production of construction ceramic blocks by an agglomeration method at a temperature of 1100-1150 °C.

The method of sintering lunar soil in a microwave oven can be an alternative to the method of sintering lunar soil using sunlight. The method of sintering regolith in the microwave oven is characterized by a much greater performance and ease of execution.

The received results can be used at design of the equipment for production of construction blocks from lunar soil, his test and the subsequent working off on materials – simulators.

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