Simulation of heat and mass transfer processes in technological equipment tests for autonomous complexes

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The object of the study is the long-term technological equipment thermal test designed to ensure the autonomous engineering systems which are functioning at elevated temperature values. The test is carried out in order to confirm the equipment effective performance and reliability in conditions similar to the operating ones. The article considers the thermal testing technology, based on equipment elements placement in an open tank with heated water. When organizing long thermal tests, it is required to reduce energy cost and evaporated water loss from the exposed reservoir surface, which in turn requires that we analyze and determine the outside air heat and mass transfer parameters, with the equipment located in the open water tank. The article describes temperature regime and mass transfer mathematical models, gives simulation results during thermal testing in the open tank filled with water. To reduce the required energy and evaporation from the open water surface, we assessed the results of placing hollow spherical insulators on the water surface and showed an opportunity to reduce evaporation masses of more than an order of magnitude by reducing test equipment energy consumption by more than 2 times.

Keywords: *tank, heating and evaporation of water, simulation of heat and mass transfer.*

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