

NUMERICAL AND EXPERIMENTAL STUDY HEAT-MASS TRANSFER WITH PHASE TRANSITION IN CAPILLARY-POROUS STRUCTURE OF HEAT PIPES

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Abstract

The mathematical model of the processes, occurring in capillary structures of the evaporator of the capillary pump loop (CPL) at work in a mode of evaporation and in a mode of boiling is formed. It based on a two-phase mixture model of liquid flow developed by S. Beckerman, which received by transformation of separate flow model on the basis of the third condition of balance of phases, i.e. an invariance of quantity of substance at phase transition of a liquid in to a vapor. The important assumption of this model is equality of temperatures of a solid matrix of capillary - porous structure and liquid. However, from the analysis of the literary data we made a conclusion that this assumption is unacceptable if a capillary - porous structure is made of metal with high heat conductivity. Hence, as against S. Beckerman model, where processes in capillary - porous structure with low conductivity (sand) is investigated, the mathematical model takes into account process heat transfer from solid matrix to the heat-carrier.