

## ABOUT SOME OF THE POSSIBILITIES OF USING HEAT PUMPS IN PROCESSES THAT INVOLVE THE MOVEMENT OF SUBSTANCE

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*The purpose of the work* is study of some possible processes involving the use of a moving substance (MS) and heat pumps (HPs) with their heat exchangers (HEs), in which MS is brought into thermal contact (TC) with heat absorbing and heat releasing HEs of at least two HPs. In particular, *the purpose of the work* is to evaluate the efficiency (primarily, energy efficiency) processes which, in particular, involve the condensation of a substance with MS (for example, condensation of water vapor from wet moving gas). The partial case of the specified investigated processes [1] is schematically illustrated in Fig. 1.

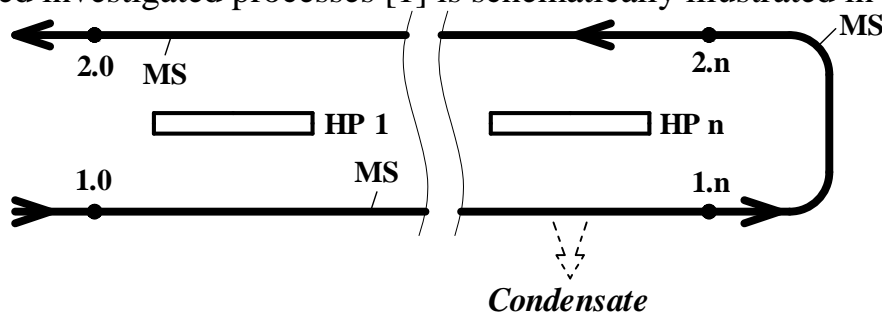


Fig. 1. Simplified scheme of an example of a possible process of condensation of a substance with MS (for example, condensation of water vapor from wet moving gas) using HPs: direction of MS movement is indicated by arrows; HP 1, ..., HP n – HPs of total amount n; 1.0, 1.n, 2.n, 2.0 – successive positions of MS in the process of its movement (1.0 – immediately before TC of MS with the 1st HE of HP 1, 1.n – immediately after TC of MS with the 1st HE of HP n, 2.n – immediately before TC of MS with the 2nd HE of HP n, 2.0 – immediately after TC of MS with the 2nd HE of HP 1).

**Results.** For the specified investigated processes, evaluative are made:

- 1) theoretical studies;
- 2) experimental studies using thermoelectric heat pumps based on Peltier modules and moving wet air.

**Conclusion.** On the basis of the results of these theoretical and experimental studies it can be concluded that there is a fundamental possibility of increasing the energy efficiency of some of the specified processes, in particular, the processes of condensation of water vapor from wet moving gas (MS) using HPs in accordance with the scheme of Fig. 1 while increasing (in case of increase) in the amount of HPs (which are used in the scheme of Fig. 1) n.

### References

1. Kshevetsky O.S. (2017). Estimation of the efficiency of partial case of heat and mass transfer processes between heat pumps and moving substance, part 1. *J. Thermoelectricity*, №6, 39–55.