REPLY TO M. I. TSAPLIN'S COMMENTS

I. T. Shvets and E. P. Dyban

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The parametric equation* (6) for contact heat transfer obtained in our paper takes into account the basic thermophysical properties both of the gaseous medium and of the material of the surfaces in contact, but in dealing with the results of a large number of experiments we failed to recognize the dependence of the coefficient c on the ratio $\lambda_{material}/\lambda_{medium}$.

The experimental data of Shlykov and Ganin also do not indicate the existence of such a relationship. The experimental points corresponding to transmission of heat through a contact in air and in helium, when represented in the form $Nu_K - 1 = f(p/\sigma_u)$, cannot in practice be separated.

Processing of 78 experiments by various authors has shown that in 62 of them the quantities c and n are constant over the whole range of specific pressure at the contact investigated, which is sufficiently convincing confirmation of the validity of the general form of Eq. (6) for contact heat transfer.

The numerical value of the exponent n = 0.8 was determined from the results of 43 tests, but in some of the tests the values of the constant coefficient c differed appreciably, even under experimental conditions stated by the authors to be identical.

In our opinion, the discrepancies mentioned may be due to inaccuracies in the quantitative evaluation of the microgeometry of the surfaces in contact, since not one of the sources used in the paper gave data on surface microwaviness, and the majority of the authors assessed only classes of surface cleanness which permitted variations in the height of microirregularities by a factor of almost two. Therefore, the value of coefficient c = 85 was determined from the results of 26 tests showing the closest agreement among themselves.

*The numbering of the equations follows that of our paper.

The fact that all ten of the tests by Shlykov and Ganin are described by Eq. (6) with an exponent n = = 0.8, after processing in the way we proposed, while nine of them have other values* of the coefficients c, cannot in any case be regarded as refuting the theoretical conclusions reached in our paper, but only as confirming the need to conduct additional experiments in which special attention ought to be directed to studying the quantitative microgeometrical characteristics of the surfaces in contact.

The experimental data presented in Fig. 2 of the paper, on heat transmission through a contact in vacuum, were obtained at a chamber pressure 666.62–266.644 N/m^2, which corresponds to heat transmission through a contact in a medium with a reduced value of the thermal conductivity.

The absolute value of thermal conductivity (λ_{medium}) was determined in this case from the value of the heat transfer coefficient at the contact (for a given pressure of the surrounding medium), extrapolated to the value $p \to 0$.

To calculate the heat transfer coefficient at a contact in a high vacuum, it is necessary to use Eq. (7) of the paper, which has the form

$$\alpha_K = \alpha_0 + c_1 (p/\sigma_u)^{0.8},$$

where c_1 must be determined from the appropriate experimental data.

The authors tender their apology to readers for an error in the paper [Eq. (6) cited instead of Eq. (7)].

*The heat transmission through a contact in air and in helium for both grades of steel (six tests in all) is described by Eq. (6) with c = 24, while the heat transmission through a contact in the same conditions for dural is described by Eq. (6) with c = 230.