ON THE DETERMINATION OF THE TRUE TEMPERATURE OF REFRACTORY METALS BY RADIATION IN THE "GRAY" APPROXIMATION

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As known, radiation thermometers (pyrometers) do not require direct contact with the measurement object and have a high speed. Therefore, they are widely used in thermophysical research. However, in this case, it is necessary to know the emissivity ϵ of the site of sight at a given wavelength in the direction of radiation. Moreover, the value of ϵ, as a rule, is unknown.

In this report, the simultaneous determination of the thermodynamic (true) temperature and the emissivity of opaque, free-radiating object from the registered thermal radiation spectrum in the "gray" approximation is considered. It is assumed that in a given spectral interval $ln\epsilon = a_1 + a_2/\lambda$, where, a_1, a_2 are constant coefficients. It is shown that a measurement object can radiate as a "gray" body, even in the case when its emissivity is changing several times over the spectrum. A relation is presented for estimating the accuracy of the "gray" approximation For refractory metals, the spectral intensities distribution in the visible spectrum of radiation is compared. The use of a tungsten helix as a source of illumination is discussed. Approaches based on more realistic models for emissivity are discussed.