Hybrid remote sensing of temperature and emissivity distribution on the surfaces of heated bodies

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During remote temperature measurements in limited frequency ranges of thermal radiation, it can be assumed that the emissivity of a heated body is independent of the wavelength. It is known as the "gray body approximation." In general, it does not hold and can be represented by a polynomial approximation. "Hybrid method" [1] (a) reduces multidimensional minimization to one-dimensional; (b) provides a means for graphical control of the minimization process and the derivation of analytical expressions for measurement errors: (c) reduces computation time. The hybrid method combines linear and nonlinear regression algorithms. It is also shown that the application of the hybrid method in temperature measurements using multispectral cameras allows for the investigation of melting processes and phase transitions at high pressures and temperatures. As examples, results from experiments on the melting of nickel aluminide are presented [2]. This research was performed with the financial support of the Ministry of Science and Higher Education of the Russian Federation (FFNS-2022-0008) The research was carried out using the unique scientific installation 'Laser Heating in DAC' in STC UI RAS [ID: 507563, https://unu.ntcup.ru].

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