A TECHNIQUE FOR DETERMINING THE ACTIVE COMPONENT OF THE VOLTAGE DROP ACROSS A SAMPLE IN PULSED JOULE HEATING EXPERIMENTS

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Pulsed Joule heating is widely used to study the properties of metals, graphite and some other conductive materials at high temperatures and pressures. The experimental technique that made it possible to obtain unique data on the thermophysical properties of expanded liquid metals and graphite cite Kondr1: 2016 is that a sample in the form of a thin strip is placed between two plates of sapphire (or quartz glass) and heated by an electric current pulse of 10-100 amplitude and rise time on the order of a microsecond. During heating the time dependences of the current flowing through the sample and the voltage drop across it are measured. This allows us to determine the time dependences for the heat dissipated in the sample and its resistance cite Kondr2: 2016. However, an alternating current flowing through the sample induces a significant electromotive force in the high-voltage divider circuit, which is used to measure the voltage drop across the sample. To determine the active component of the voltage drop, that is used to calculate dissipated heat and resistance, it is necessary to subtract this inductive contribution from the total (measured) voltage. In this paper, a method is presented that makes it possible to determine the active component of the voltage with reasonable accuracy. The method is that the voltage across the sample is measured simultaneously with the help of a voltage divider and a calibrated current shunt. The results of such measurements are discussed.

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2. Kondratyev A. M., Korobenko V. N., and Rakhel A. D. // Carbon. 2016. V. 100. P. 537.