Thus, the reflecting properties' characteristics of a flat sample of a simple shape (circle, rectangle) can be represented for small incidence angles in the form of a product of two independent factors: the reflection coefficient \( F \) and the shape coefficient \( S \), providing the samples are made of materials without losses and have larger than resonance dimensions, or have any dimensions, but are made of materials possessing considerable losses. The first factor is a function of only the electromagnetic parameters, and the second of only the sample dimensions and its positions in the radiation field.

**LITERATURE CITED**


**RAISING THE ACCURACY OF THE ELECTRICAL CALIBRATION OF PONDROMOTIVE ULTRAHIGH-FREQUENCY POWER METERS**

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It is known that the total calibration of ponderomotive power meters consists of two stages, the electrical and the mechanical. The electrical calibration consists of evaluating the electrical calibration coefficient, which represents the relation of the force to the power and is determined experimentally by a method based on the adiabatic action invariance of cavity resonators without losses [1].

The calibration schematic recommended in [1] is shown in Fig. 1. The main difficulty of calibrating by means of this circuit consists in reading small reflected-wave phase variations due to virtual displacements of the instrument's moving part. The large attenuation of the measuring line (normally of the order of 20-25 db) requires, for an accurate calibration, very sensitive indicating devices (sensitive galvanometers, a superheterodyne receiver, etc.).

The suggested calibration circuit consisting of a hybrid T-junction (Fig. 2) has a higher sensitivity for small reflected-wave phase variations than the circuit in Fig. 1, thus providing a much higher accuracy in determining the electrical calibration coefficient for the same indicating devices in either case.

*See English translation.
Fig. 1. Calibration schematic for a ponderomotive power meter using a measuring line. 1) ponderomotive power meter; 2) measuring line; 3) instrument amplifier; 4) ferrite gate; 5) ultrahigh-frequency oscillator with a wave meter; 6) shorting plunger.

The calibration technique by means of the suggested circuit does not change the physical essence of the process and consists of the following.

The plunger in the side branch I of the hybrid T-junction is set arbitrarily, but its initial position $x'_0$ is noted. The plunger in branch II is adjusted for a minimum reading on the indicator of the detector circuit for an initial angular position $\Theta_0$ of the instrument's moving element. Increases in the reading of the indicator are observed as the angle of the moving element is varied by $\Delta \Theta = \Theta - \Theta_0$. Then the plunger in branch I is adjusted for a minimum indicator reading, and its new position $x'$ is noted, giving $\Delta x' = x' - x'_0$. Next the plunger in branch I is displaced with respect to position $x'_0$ by $\Delta x'' = \lambda_w/4$, where $\lambda_w$ is the wavelength in the waveguide; the new position of the plunger will be $x''_0 = x'_0 + \lambda_w/4$, and the moving element of the instrument will return to its original position, $\Theta_0$. The plunger in branch II is then adjusted for a minimum reading on the indicator.

Next the position of the plunger in branch I, $\Delta x'' = x'' - x'_0$, required to compensate for the phase shift caused by the displacement of the instrument's moving element by $\Delta \Theta$, is determined in a similar manner. The calibration coefficient is calculated from formula

$$k_c = \frac{1}{2f\lambda_w} \left[ \frac{\Delta x' + \Delta x''}{\Delta \Theta} \right],$$

where $f$ is the frequency.

It can be shown that the circuit in Fig. 2 is $c/4$ times more sensitive to small phase changes than the one shown in Fig. 1, $(c$ is the power loss of the measuring line). The sensitivity of the new circuit is 79 times higher than that of the circuit in Fig. 1 if the latter includes a 331 measuring line, and the remaining conditions are the same.

The high sensitivity of the new circuit considerably lowers the random error in determining the calibration coefficient. Thus, in calibrating a ponderomotive power meter in the three-centimeter band through the Fig. 1 circuit, the calibration coefficient in the middle of the band (3.30 cm) amounted to $(1.74 \pm 0.08) \cdot 10^{-4}$ d·cm/w·rad, and the relative limiting error to 4.60%. When calibrating by means of the Fig. 2 circuit under similar conditions, the calibration coefficient amounted to $(1.78 \pm 0.01) \cdot 10^{-4}$ d·cm/w·rad, and the relative limiting error to 0.50%.

It should be noted that the limiting error in both instances is considered to be the error committed in measuring the value of $\frac{\Delta x' + \Delta x''}{\Delta \Theta}$.