USING A COAXIAL RESONATOR MEASURING CONVERTERS WITH SHORTENED CAPACITIES FOR MOISTURE METERING SMALL BIOOBJECTS

Poletaev D. A.

Physics and Technology Institute of V.I. Vernadsky Crimean Federal University, Simferopol, Crimea
Research and Education Centre for Noospherology and Sustainable Development of V.I. Vernadsky Crimean Federal University, Simferopol, Crimea, Russia
E-mail: poletaevda@cfuv.ru

Currently, near-field microwave diagnostic methods are widely used in science, technology. The widespread use of the equipment, based on these methods, due to the indestructibility of the sample, the lack of physical contact, the possibility of obtaining the express data in research. In most such equipment is demanded in agriculture (moisture meters), in various areas of science and industry (microwave microscopy) and in biology (for the study of the characteristics of the objects).

The aim of the work is to identify and analyze the factors influencing the sensitivity of the measuring converters that used to determine the moisture content in biological objects, building characteristics conversion, and experimental verification of the simulation results.

The calculations show that during the theoretical description of the characteristics of the resonator measuring converters with a coaxial aperture in the study of dielectrics with low losses is necessary to consider the radiation losses. Investigations of the influence of the air gap in the information signals, built conversion characteristics. Quantitative characteristics influence the geometry of the aperture on the quality factor in a wide range of electro-physical parameters of small biological objects objects, allowing to identify the main directions of optimization of the sensitivity of the resonator measuring transducers.

Keywords: biological object, microwave resonator, resonator measuring converter, aperture, conversion characteristics.

References

1. Chen L. F., Ong S. K., Neo S. R., *Microwave electronics measurement and materials characterization*, 537 p. ("John Wiley & Sons Ltd", Southern Gate, 2004).
2. Lisowski V. V., *Theory and practice of microwave moisture control of agricultural materials*, 292 p. ("UOBGATU", Minsk, 2005) (in Russ.).
3. Xu D., Liu L., Jiang Z., Measurement of the dielectric properties of biological substances using an improved open-ended coaxial line resonator method, *Microwave theory and techniques*, **35**, 12 (1987).
4. Kuznetsov A. N., Turka I. I., Volkova I. A., EHF dielectrometry biological fluids in a disturbed water metabolism, *Biophysics*, **45**, 6 (2001) (in Russ.).
5. Gordienko J. E., Good Y. I., Poletaev D. A., The contribution of the vibrational and radiative loss characteristics of microwave transmitters with coaxial measuring aperture, *Radio engineering*, **157**, 108 (2009) (in Russ.).
6. Brandt A. A., *Investigation of dielectrics at microwave frequencies*, 403 p. ("Sci. Literature, Moscow", 1963) (in Russ.).
7. Kuraev A. A., Popkov T. L., Sinitsyn A. K., *Electrodynamics and propagation*, 358 p. ("Bestprint", Minsk, 2004) (in Russ.).
8. Grigoriev A. D. *Electrodynamics and VHF*, 335 p. ("High School", Moscow, 1990) (in Russ.).