

ABSTRACT

The invention relates to the field of electrical engineering and, more specifically, to the remote measurement of the dielectric permittivity of dielectrics. In order to determine the dielectric permittivity of a dielectric object against the background of a reflector, the dielectric object is irradiated with coherent microwave radiation at N frequencies to produce a three dimensional microwave image of the dielectric object and the reflector, and two or more video cameras, synchronized with the microwave radiation source are used to produce a video image. The obtained video image is converted into digital form and a three dimensional video image of a given region is constructed. The three dimensional video image and the microwave image are converted into a general system of coordinates. The distance Z_1 between the microwave radiation source and the reflector that is free of the dielectric object, and the distance Z_2 between the microwave radiation source and the section of the microwave image of the reflector in the region of the dielectric object are calculated. On the basis of the video image, the distance Z_3 between the microwave radiation source and the video image of the dielectric object is determined in the general system of coordinates. The dielectric permittivity of the dielectric object is then determined from the relationship: (I). The invention makes it possible to remotely determine the dielectric permittivity of a moving, irregularly-shaped dielectric object.

$$\varepsilon = \left(\frac{Z_2 - Z_3}{Z_1 - Z_3} \right)^2 \quad (I).$$