

Method of calculation of thermal emissions of subwavelength particles

A. N. Sviridov and L. D. Saginov

FSAC VIM

5 1st Institut'sky proezd, Moscow, 109428, Russia

E-mail: sviridto@yandex.ru

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A new method is proposed for calculating the thermal emissions of subwavelength particles using the dependence of the Q-factor of electrically small radio antennas (ESA) on their relative (relative to the wavelength of the emitted wave) sizes. This dependence characterizes the fundamental limit of the minimum relative sizes of ESA radio antennas. With the help of the proposed methodology, calculations of the dependences of the capacities and coefficients of thermal radiation of graphite and gold balls on their sizes were carried out. For comparison, similar dependencies obtained using other techniques are given. This method of calculating the thermal emissions of subwavelength particles adequately describes the dependence of the power and coefficient of thermal radiation on the particle size.

Keywords: Planck's law, Stefan-Boltzmann's law, Wien's displacement law, radiation coefficient, absorption coefficient, spatial spectral mode, mode energy, subwavelength particle, nanoantenna, electrically small antenna (ESA), Q-factor, near field, far field.

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