THE INFLUENCE OF THE SKIN EFFECT ON INPUT IMPEDANCE IN A COAXIAL CABLE IN A NO-LOAD STATE AND A SHORT-CIRCUIT STATE

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ABSTRACT *The article presents the influence of the skin effect on input impedance of a coaxial cable in a no-load state and a short circuit state, when taking into account qualitative and quantitative influence of this effect on total unit impedance of a coaxial cable, that is resistance, self inductance of the conductor of the cable and the cable screen, and on the mutual inductance between them. The calculations have been performed for the type YHKXS cable assuming: wire radius* R *= 0.01 m, relative thickness of the cable insulation characterized by the parameter* $\eta = \frac{R_1}{R} = 1.8$*, whereas the relative thickness of the screen by the parameter* $\tau = \frac{R_1}{R_2} = 0.9$ *(*R_1 *- interior radius of the cable screen,* R_2 *- exterior radius of the cable screen). Assumed frequency value was* f *= 100 kHz.*

With a given load impedance, the input impedance of a coaxial cable depends on the skin effect. Figures 2, 3, 5 and 6 show that with the increase of the line's length, the maximum value of the input impedance module in no-load state (Fig. 2, 3) as well as in short-circuited state (Fig. 5, 6) decrease, moreover, the amplitudes of input impedance module, after taking into consideration the skin effect, are considerably smaller than without accounting for this effect. The wavelength in a coaxial cable without taking into consideration the skin effect equals λ = 1558,7 *m and is smaller than the wavelength when taking the mentioned effect into consideration. In that case* λ_n = 1829,5 *m. It is the result of the fact, that the phase lag coefficient depends primarily on total inductance of a coaxial cable which causes its decrease, as well as of total inductance, with the increase of frequency.*