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PS2-10: Peculiarities of the Oscillations of Electromagnetic Field of a Charged Particle Rotating About a Metallic Ball

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Some characteristic features in the electromagnetic field of a charged particle uniformly revolving along an equatorial orbit around a metallic ball has been studied. The obtained numerical results are based on the corresponding exact solutions of the Maxwell equations. They have been derived in [1,2] by means of the Green functions method, and earlier in [3] for special cases when the revolving particle is either non relativistic or ultra relativistic. In these solutions there are no limitations on the value of dielectric permittivity of the ball material.

In the present work the results obtained in [1-3] are supplemented by new non-trivial conclusions. Namely, it is shown that (i) if the particle revolves at small distance from the surface of metallic ball, it may generate high power oscillations of electromagnetic field localized near the ball-vacuum interface, and (ii) at large distances from the particle trajectory, these surface oscillations of electromagnetic field are accompanied by intense quasi-monochromatic radiation.

A visual explanation of this effect is given and its possible application for generation of surface plasmons in spasers [4] is discussed.

References

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