

Radiation from Relativistic Electrons in Periodic Structures "RREPS-23" & Electron, Positron, Neutron and X-ray Scattering under External Influences "Meghri-23"



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Electric field lines of the helical undulator

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One of the devices for generating circularly polarized radiation of high frequency is a helical undulator in which a relativistic charged particle moves along a helical trajectory. In this paper, the spatial distribution of the electromagnetic field produced by such a particle is analyzed using electric field lines. The equations of electric field lines, which, due to the presence of curvature and torsion in the trajectory, do not contain a class of lines lying in the same plane, are precisely solved. A special algorithm for erasing invisible parts of the lines has been developed to represent the lines in space. Animation of field pictures for different viewing angles is applied. Several remarkable features of the field picture are revealed, in particular, that the hard component of the radiation is concentrated in the plane orthogonal to the undulator axis and passing through the position of the particle at the current moment of time.

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