

# Amplification of a Surface Electromagnetic Wave by a Running Over Plasma Surface Ultrarelativistic Electron Bunch as a New Scheme for Generation of Terahertz Radiation

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The surface electromagnetic waves (SEW) on plasma-like media attract special attention of researchers due to their unique properties. The SEW are widely applied in physical electronics due to its high close to light phase and group velocity leading to its uncomplicated generation by relativistic electron bunches and output from plasma. We discuss the theoretical problem of SEW amplification with the help of ultrarelativistic monoenergetic electron bunch running over flat plasma surface. Such a problem of generation of three-dimensional electromagnetic wave (wakefields) in plasma with the help of ultrarelativistic electron and ion bunches through Cherenkov resonance radiation was solved in our earlier work. In the present work we apply this method. It is shown that when the ratio of electron bunch number density to plasma electron number density multiplied by a powered to 5 relativity factor is much higher than 1, the SEW saturation electric field induced by trapping of bunch electrons gains the magnitude  $\sim 10^{11}$  V/m, the energy density flux (Poynting vector)  $\sim 10^{15}$  W/cm<sup>2</sup> and does not approach the surface electromagnetic wave front breakdown threshold in plasma. Here, we discuss the possibility of generation of superpower Terahertz radiation on a basis of such scheme.

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