S3-P-027601

DIFFRACTION OF A MONOPOLAR ELECTROMAGNETIC PULSE ON A SLIT

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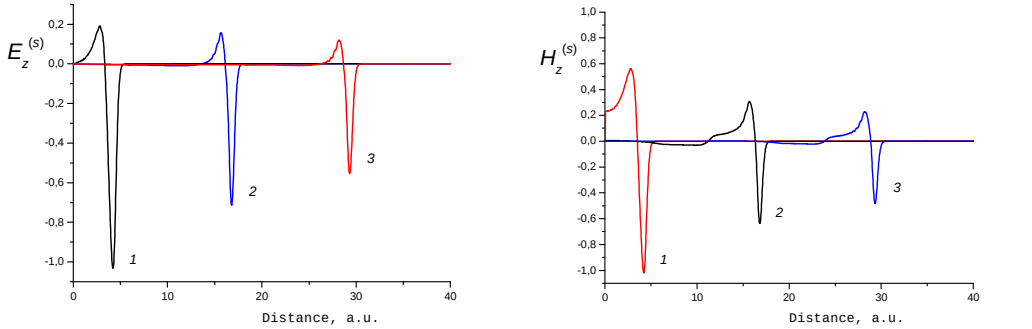
A number of works published recently talk about the possibility of generating and emitting monopolar (or unipolar) electromagnetic pulses (MEMP) into free space [1,2]. Possible mechanisms for obtaining MEMP are considered. For example, the generation of MEMP is possible during the passage of a flat short bunch of relativistic electrons through an obliquely mounted conducting foil [3,4]. An electric discharge can be used for the radiation of a pair of solitary MEMP of opposite polarity in free space [5], etc.

Separately, there is the problem of managing of MEMP: its focus, change in the direction of distribution. To solve this problem, it is necessary, in particular, to consider the structure of the field formed during the passage of MEMP through a region of space containing inhomogeneities of a simple geometric shape.

This report presents the results obtained in a series of computational experiments, the purpose of which was to reveal the features of the spatiotemporal distribution of the diffraction field of a short MEMP with a flat front on a slit.

In Fig.1. the dependences of the diffraction field components on the longitudinal coordinate are shown at different times for two different polarizations of the incident pulse. In both cases, the field is bipolar, and for the TM polarization its profile is close to the profile of the time derivative of MEMP.



a) b)

Fig.1. Diffraction field on the axis of the system at different times (curves *1*,*2*,*3*). Case of *TE*- (a) and *TM*- (b) MEMP polarization.

It is shown that, for the considered cases, the MEMP diffraction field has a bipolar (or quasi-monopolar) form at distances comparable to the aperture size of the optical system, regardless of the polarization of the incident radiation.

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