# Propagating of a light bullet through the beam of CNT with a metallic inhomogeneity lattice

Popov A.S.[1]*, Belonenko M.B.[2], Lebedev N.G.[1]

[1]*Volgograd State University, 400062, Volgograd, Russia*
[2]*Volgograd Institute of Business, 400048, Volgograd, Russia*
**e-mail: A.Popov.VolSU@gmail.com*

Creation of powerful lasers and the unique accuracy of optical measurements have led recently to a considerable progress in the study of nonlinear phenomena observed in a wide range of substances with very different physical properties [1, 2]. The subject of inquiry should be a substance with pronounced nonlinear properties, and, on the other hand, it should be extensively used in applications. Carbon nanotubes (CNTs) are unique macromolecular systems [3], so they are increasingly attracting the attention of the researchers in the last decade. Their rather small nanometer diameters and relatively large micrometer lengths make them a novel system for the use in nano- and microelectronics. The study of optical solitons in carbon nanotubes is one of the promising fields of modern research.

In the construction of the model of electromagnetic field propagation in a 2D array of carbon nanotubes we assume that the electromagnetic field strength vector $\mathbf{E}(x, y, t)$ is directed along the tube axis $z$, while the electromagnetic wave moves in the transverse direction. Here we consider the ideal case, when carbon nanotubes have a zigzag structure, and are situated at equal distances (0.34 nm) from each other.

We used the simplest model to determine the current in the region occupied by the metal wire, namely we supposed that the Ohm's law is satisfied in the area occupied by the wire: $\boldsymbol{j} = \sigma \boldsymbol{E} = -\sigma \partial \boldsymbol{A}/c\partial t$, where σ is the complex conductivity, which generally depends on the applied field frequency.

The results of numerical simulation show that periodic partition of the maximum does not occur and there is no exciting of inner vibrational modes of light bullets in contrast to the system considered in [4].

The light bullet decays rapidly for a sufficiently large number of layers. However, when a number of layers in the lattice are small (in the direction of the light bullet) the bullet propagation is stable, but its duration is reduced. This fact can be used to create a ultrashort light pulses.

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