

## **Modeling of Ball Lightning by Means of Exploding Wires in Strong Magnetic Field Which Quickly Falls Down**

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### **Abstract**

It is known that natural ball lightning can possess large energy. Origination of ball lightning is connected with the thunderstorm phenomena and with ordinary lightning. Ordinary lightning pro-

vides intense energy fluxes, which act with matter. In addition, the ordinary lightning creates a strong magnetic field, which quickly falls down at disintegration of the discharge channel. It is possible to presume, that similar conditions for formation of plasma objects can be provided by means of exploding wires. This phenomenon represents a convenient way for interaction of intense energy fluxes with matter. Herewith a strong magnetic field is created, and this magnetic field quickly falls down after disintegration of the wire. On the basis of the stated preconditions the experiments on modeling the phenomenon of ball lightning by means of electric explosion of wires with high electric conductivity have been planned. Copper and aluminum wires with the large section well suit for experiments because it is necessary to create a strong magnetic field with an induction about 1,5 T. If linear wires are used for explosion that for formation of plasma configurations with diameter of the order 10 cm and lifetime of 3 seconds the current impulse at level of 600 kA are required. If to execute exploding wire in a form of the spiral, which is rounded off as bagel, then the current pulse can be reduced proportionally to the spiral coil number.

Experiments were carried out under small electric power with the wire in the form of the spiral, which is rounded off as bagel. Experimental installation for electric explosion of wires consisted of the condenser battery in capacity about 0,06 F, loaded to a voltage of 400 V. The unloading of battery has been making through powerful switch. Exploding wires were implemented of copper wire in diameter of 0,4 mm, the big radius of spirals made about 10 mm, and the small radius made 3 mm. The number of spiral coils was varied from 20 up to 60. Installation included the equipment for video shootings and fixings of the waveforms of voltages and currents of the discharge; waveforms of light, acoustic and electromagnetic radiation also were fixed.

During experiments the current amplitude was nearly 5 kA for spiral with coil number of 30, electric explosion as usual was occurring approximately through 2 milliseconds after submission of a current impulse on the spiral. Thus with probability about 5 percent

brightly shone independent plasma objects of the spherical form with diameter about 4 cm and lifetime about 0,5 seconds were formed. The given phenomenon well enough corresponds to descriptions of ball lightning, especially at the slowed down viewing process of electric explosion.