

INVESTIGATION OF WIRES LAYOUT IN EXPLODING WIRE ARRAY

S. ANISHCHENKO¹, A. GURINOVICH¹, E. GURNEVICH¹, D. LEONENKO², A. ROUBA¹

¹*Research Institute for Nuclear Problems, Minsk 220030, Belarus*

²*Electrophysical laboratory, Minsk 220088, Belarus*

Exploding wires serving as opening switch for pulsed power applications are widely studied. Geometry of exploding wire array (EWA) could significantly influence on the output parameters of the switch, namely: the amplitude and duration of the produced pulse [1,2].

Compact EWA design could imply use of non-strait wires, for example, zigzag or helical installation [3]. High-voltage breakdown should be taken into account for a compact EWA, thus use of insulating gas should be considered as an option. According to multiple studies SF₆ looks to be the best choice for EWA. Experiments demonstrate possibility to keep the amplitude of the EWA-produced high-voltage pulse with twice as short array length with zigzag wires installation in pressurized SF₆. Simultaneous increase of pulse duration after switching to the load could reach 30% as compared to the pulse produced with straight wires exploded in air.



Fig.1. Exploding wire array with zigzag wires installation.

Wires damage is shown to be of high importance during installation. Any extra tension applied to wires could cause reducing of amplitude of high-voltage pulse as much as 15%.

REFERENCES

- [1] G.A. Mesyatz, "Pulsed power," Springer, Boston, MA, 2005.
- [2] A.E. Borisevich, S.L. Cherkas, "Effect of the Conductor Radius on the Electric Explosion Dynamics: Magnetohydrodynamic Simulation," *Technical Physics*. Vol. 57, No. 10, P. 1380–86, 2012.
- [3] D. McCauley, D. Belt, J. Mankowski, J. Dickens, A. Neuber, and M. Kristiansen, "Electro-explosive fuse optimization for helical flux compression generator using a non-explosive test bed," *Proceedings of 16th IEEE International Pulsed Power Conference*. 2007.