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Pulse Series Generation Based on the Resistive Load of Neutron Source Type

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There is two types of pulse neutron radiation sources:

a) accelerators generate beams:

- an electron beam interacting with the target generates photo-neutrons;
- beam of hydrogen atoms (or protons) interacting with the target generate neutrons (n1) due to the proton splitting.

b) pulse nuclear reactors are neutrons sources due to nuclear reaction.

One of the possible version of accelerator is a plasma opening switch (POS). At the mode of magnetic self-insulation the ions between the cathode and the anode of POS are accelerated through the potential difference. One of the kinds of ions is ions of deuteron (D).

The flux of deuteron ions is directed from the anode to the cathode and on the near-surface layer of the cathode the fusion reaction can occur. For example, $D+D \rightarrow He3+n1+3.26 \text{ MeV}$, where He3 isotope of helium. In other words POS can also be a source of neutrons. Thus, for generator series train pulses base on inductive storages, POS can be used as the resistive load [1].

The POS as the resistive load that is offered has a number of features:

- a) the duration of the load is limited to several microseconds;
- b) the amount of the load is nonlinear and can change from the mode idle run to the mode short circuit.

The paper considers a number of technical solutions which enable the generation of a series of pulse trains at the mode of D-D interaction. Besides, some possible types of loads are considered, for example, additional intensification of the neutron flux or a combination of the neutron pulse with other kinds of pulse radiations, for example x-rays.

Reference

1. Egorov O.G. "Features of generating pulse series and pulse trains of gigawatt power and millisecond duration with resistive loads and loads of railgun type" Proc. IPMHVC 2014, Santa Fe , MN,USA, pp.533-537.

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