

PULSED GENERATOR WITH PSEUDOSPARK SWITCH FOR SKIF BOOSTER RING KICKER'S POWER SUPPLY

A.V. AKIMOV^{1,2}, P.A. BAK¹, Y.D. KOROLEV³, N.V. LANDL³, V.D. BOCHKOV⁴, D.V. BOCHKOV⁴

¹Budker Institute of Nuclear Physics of Siberian Branch Russian Academy of Sciences, Novosibirsk, Russia

²Novosibirsk State University, Novosibirsk, Russia

³Institute of High Current Electronics of Siberian Branch Russian Academy of Sciences, Tomsk, Russia

⁴Pulsed Technology Ltd., Ryazan, Russia

SKIF is a synchrotron light source that is being built in Novosibirsk. For beam extraction from the booster ring the magnet kickers with a stable amplitude are used. To provide a required kicker's B-filed a pulsed generator has been developed, it is capable of producing into an inductive load a current up to 5 kA with 200 ns rise time and 300 ns pulse duration. A voltage at the generator's Pulse Forming Network could achieve 25 kV. A 50 kV, 10 kA TPI-type cold cathode thyatron, or Pseudospark Switch, is considered as a most convenient device for such application. One of the most important generator's parameters that should be achieved is an output current amplitude stability at a level of ± 0.2 %. In this work it was shown that a gas-filled switch could influence on that parameter. To find the way to increase the stability the hot cathode TGI thyratrons and TPI Pseudospark Switches were tested. Also a new developed Pseudospark Switch without a high-emissivity cylinder [1] that is usually used to improve the auxiliary glow discharge characteristics has been examined.

The different driver schematics were applied to trigger the thyratrons. The driver can provide single or double trigger pulses going to one or two grids [2]. The best generator's output current stability was achieved while using a double pulse trigger of the auxiliary glow discharge thyatron's grid and a single-pulse trigger of the main grid. Also a lower thyatron's turn-on time jitter was observed while using such a driving principle. Special driver was applied for the pseudospark switch that was developed to exclude the high-emissivity cylinder. Such a switch is considered to be operated in a grounded grid mode. The test results of thyratrons and pseudospark switches taken in kicker's pulsed generator nominal operation are presented in the paper.

REFERENCES

- [1] Yu. Korolev et al., "A sealed-off pseudospark switch with nanosecond stability of triggering", IEEE Trans. Electron Devices, vol. 68, no. 9, pp. 4692-4697, Sep. 2021.
- [2] A. Akimov et al., "Application of TPI-Thyratrons in a Double-Pulse Mode Power Modulator with Inductive-Resistive Load", IEEE Trans. Dielectrics and Electrical Insulation, vol. 17, no 3, pp. 718-722, June 2010.