



No. 40

大学間連携オムニバス講義 (IPPS Lecture & Seminar)

Title: The Research on the Drive Circuits for Solid-State Pulsed Power Generator

Lecturer: Prof. Zi Li [University of Shanghai for Science and Technology]

Date & Time: December 6 2018, 13:10~14:40

Venue: Kurokami South W2[Sogo-kenkyutou](2nd Floor, 204 GP Conference room)

Abst.: The development of Marx structure generator is tend to higher output voltage, more compact. In this case, the fast rising and falling edges of the pulses are more likely to produce strong electromagnetic interference (EMI). Due to used many groups of semiconductor switches with different time sequence, it is more likely to false trigger in a smaller space. The over current will damage the semiconductors switches of the pulsed power modulator. In the common driving circuit, the discharge signal needs to be isolated because of the different potential of the switches. Many driving chips are widely used in this condition with isolated magnetic cores between power supply. If driving the switches without chips, the pulse width will be limited by the magnetic core due to voltage-second product.

In this lecture, a variety of all-solid-state pulse power generators is introduced and driving technology used in our research at first. Several high-performance gate driving circuit is introduced try to solve the problems mentioned before. In order to simplify the control, the driving circuit can generate two sets of different timing trigger signals by using one signal, and introduce its working principle in detail. From the experimental results, the width of the driving signals is not limited by the magnetic cores. Rectangular pulses and stepped pulses can be generated utilized only one drive signal. Secondly, the over current protection technology for all solid-state pulsed power generator has been illustrated, the over current protection structure is also used in the driving circuit An all solid-state Marx generator is used to verify the drive circuits developed in the research. Finally, the generation of nanosecond narrow pulse is analyzed, and a novel pulse generator based on avalanche transistor has been introduced.

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