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Development of high power burst pulse generator based on magnetic switch for bioelectrics application

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Nanosecond and sub-nanosecond high voltage pulses can provide new biological applications. A cancer treatment by an ultra-short pulse high electric field is one of them. High power pulsed electromagnetic wave has been proposed to apply the high electric field for that treatment [1]. This work focuses on the design of a compact high power pulsed electromagnetic wave generator using a nanosecond pulsed power generator for the cancer treatment [2]. In this study, we have developed the pulsed power generator that outputs the multiple pulses continuously by NLTL (Nonlinear Transmission Line) using magnetic switches. The NLTL consists of the ladder of capacitors and saturable inductors. The NLTL makes the pulse train by delaying the propagation of the pulse through the magnetic switch of each ladder. The frequency of repetition of the burst pulse is 14 MHz. The peak output voltage is 7 kV at the charging voltage of 28 kV. The number of pulses in the pulse train can be varied by the number of the units of the magnetic switch.

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[2] Y. Minamitani, T. Ueno, Y. Ohe, S. Kato, "Intensity of Electric Field Radiating from High-power Pulsed Electromagnetic Wave Generator for Use in Biological Applications", IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 17, No. 6, pp. 1895-1900 (2010)

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