World Academy of Science, Engineering and Technology
International Journal of Electrical and Information Engineering
Vol:17, No:05, 2023

Replacing an Old PFN System with a Solid State Modulator without Changing the Klystron Transformer

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Abstract : Until the year 2000, almost all short pulse modulators in the accelerator world were made with the pulse forming network (PFN) technique. The pulse forming network systems have since then been replaced with solid state modulators that have better efficiency, better stability, and lower cost of ownership, and they are much smaller. In this paper, it is shown that it is possible to replace a pulse forming network system with a solid-state system without changing the klystron tank and the klystron transformer. The solid-state modulator uses semiconductors switching at 1 kV level. A first pulse transformer transforms the voltage up to 10 kV. The 10 kV pulse is finally fed into the original transformer that is placed under the klystron. A flatness of 0.8 percent and stability of 100 PPM is achieved. The test is done with a CPI 8262 type of klystron. It is also shown that it is possible to run such a system with long cables between the transformers. When using this technique, it will be possible to keep original sub-systems like filament systems, vacuum systems, focusing solenoid systems, and cooling systems for the klystron. This will substantially reduce the cost of an upgrade and prolong the life of the klystron system.

Keywords : modulator, solid-state, PFN-system, thyratron
Conference Title : ICPMHV 2023 : International Conference on Power Modulator and High Voltage
Conference Location : Amsterdam, Netherlands
Conference Dates : May 04-05, 2023