



Contribution ID: 229

Type: Poster

115kV solid state long pulse modulator for the European spallation source (ESS)

Tuesday 20 June 2017 13:30 (1h 30m)

For generating such pulses, a long pulse modulator based on a modular series parallel resonant converter (SPRC) topology has been developed [1]. This converter is operated at a high switching frequency (100kHz) to minimize the dimensions of the reactive components and the transformer. In order to generate the required output voltage of 115kV, 8 SPRC modules each with a transformer secondary side voltage of 14.4 kV are connected in series [2]. Due to the series connection of the secondary windings, the electrical insulation of the oil isolated transformer has to withstand the full pulse voltage of 115kV.

In this paper the comprehensive design procedure of the key components of the solid state long pulse modulator is summarized. This procedure also includes the high frequency transformer design, the control design and the analytical output voltage ripple calculation. The design is verified by measurement results performed with a full-scale prototype which is operated under nominal load conditions.

[1] M. Jaritz, et al., "Optimal Design of a Modular Series Parallel Resonant Converter for a Solid State 2.88 MW/115-kV Long Pulse Modulator", IEEE Transactions on Plasma Science, Volume: 42, Issue: 10, Page(s): 3014 - 3022, October 2014.

[2] M. Jaritz, et al., "Control of a modular series parallel resonant converter system for a solid state 2.88 MW/115-kV long pulse modulator," IEEE European Conf. Power Electron. Appl., 2015.

Authors: JARITZ, Michael; BIELA, Juergen (ETH Zurich)

Presenter: JARITZ, Michael

Session Classification: Poster session II - Pulsed Power Industrial and Bio-Medical Applications

Track Classification: Pulsed Power Industrial and Bio-Medical Applications