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Experimental Results of an Isolated Resonant DC-DC Converter for High Voltage Application

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This work reports some experimental results of an isolated LC resonant DC-DC converter to generate high voltage regulated. The converter uses a single stage and it is based on a full bridge structure using MOSFETs as switching devices. The output stage of the DC-DC converter is built using series-connected lower voltage modules. The proposed topology is based on the current-fed push-pull DC-DC converter operating and controlled with PWM modulation, active clamping and zero voltage switching. The control technique PWM-Phase-Shift together with a proportional and integral controller is used to in the converter. A high voltage transformer is used to step up AC voltage and its intrinsic capacitance and leakage inductance are utilized to obtain soft-switching zero voltage and zero current switching providing loss reduction, improving efficiency and increasing the power density. The theoretical equations of the circuit operations are studied in detail and an expression for average current in load is presented. The theoretical converter efficiency operating at the nominal output power is almost 90%. The controller proposed is being experimentally used control the output voltage of a 1.8 kW prototype, fed into 400V, which biases a pulsed TWT with voltages of 400V for the grid electrode, 8 kV in the one stage depressed collector and 24 kV in the cathode.

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