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Optimized Solid-State Bipolar Marx Modulador with Resonant type Droop Compensation

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Nowadays there are many topologies based on the Marx concept using power semiconductors devices as switches that are capable to generate unipolar or bipolar high voltage pulses. In some industrial applications such as water decontamination or liquid food processing, the use of bipolar pulses instead of unipolar pulses, has demonstrated an enhanced final product or industrial process. Generally high voltage bipolar modulators require additional switches, which may allow fault tolerance capability but requires a complex triggering circuit. Alternatively, optimized bipolar topologies [1] using reduced number of semiconductors per cell create additional stress in some semiconductors during various operating modes, which increase losses. Thus, in addition to semiconductors characteristics, the design of the Marx modulator has to consider the pulse energy and the required pulse voltage droop in order to determine the capacitance of the capacitors. Considering this last point, in various applications, the used value for the capacitors is very high, making the design of a compact Marx modulator unaffordable. For this reason voltage droop compensation techniques must be considered [2, 3].
Considering the optimized solid-state bipolar Marx modulator, a voltage droop compensation technique based in resonant circuit will be proposed in this paper.

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