

Ultra-Fast Modular Solid-State Pulse Power Generators

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What – Design and implementation of a pulsed-power generator for plasma production

- More efficient plasma (Fig. 1) through ultra-fast rise time and high repetition rate.
- Modular and flexible structure (Fig. 2).
- Based on ultra-fast GaN transistors.

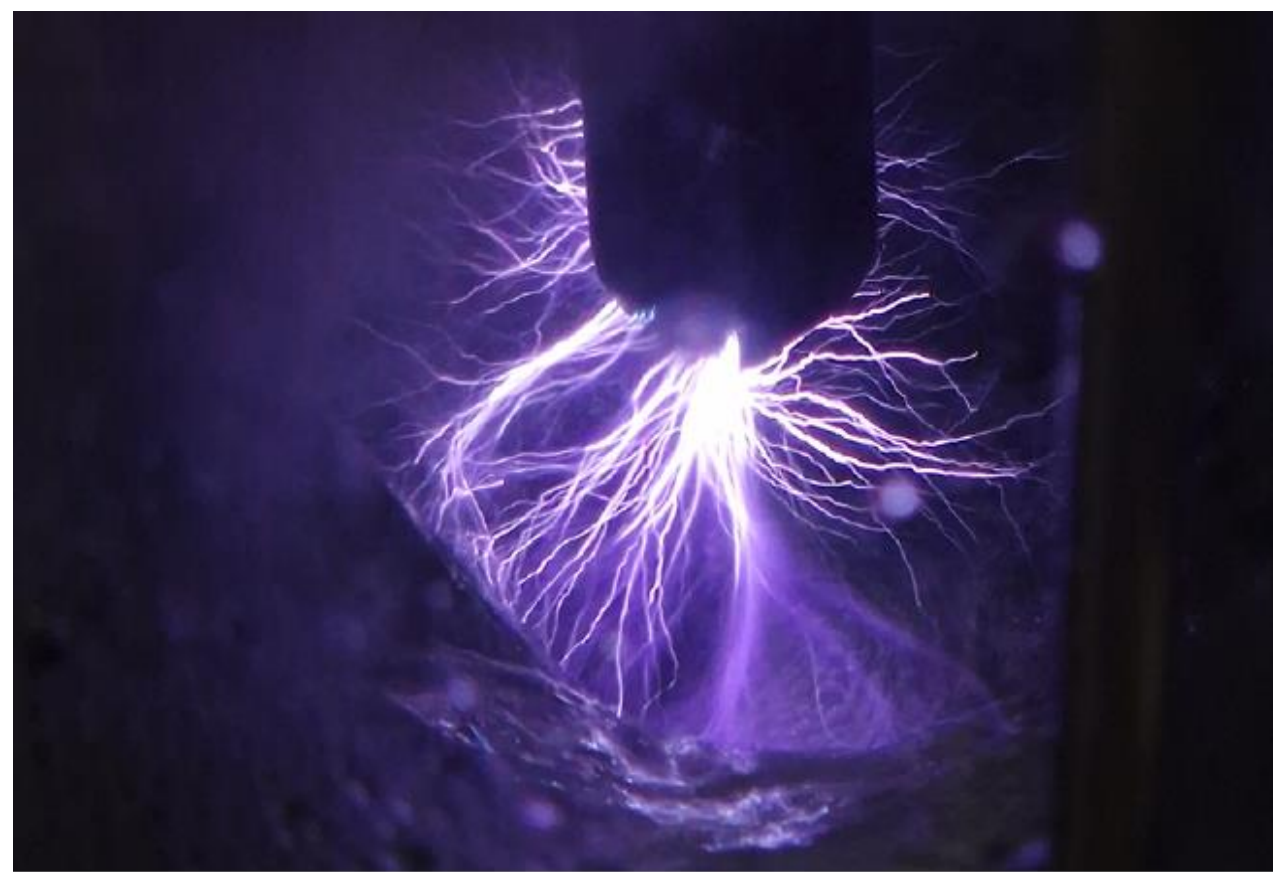


Fig. 1: Plasma generation.

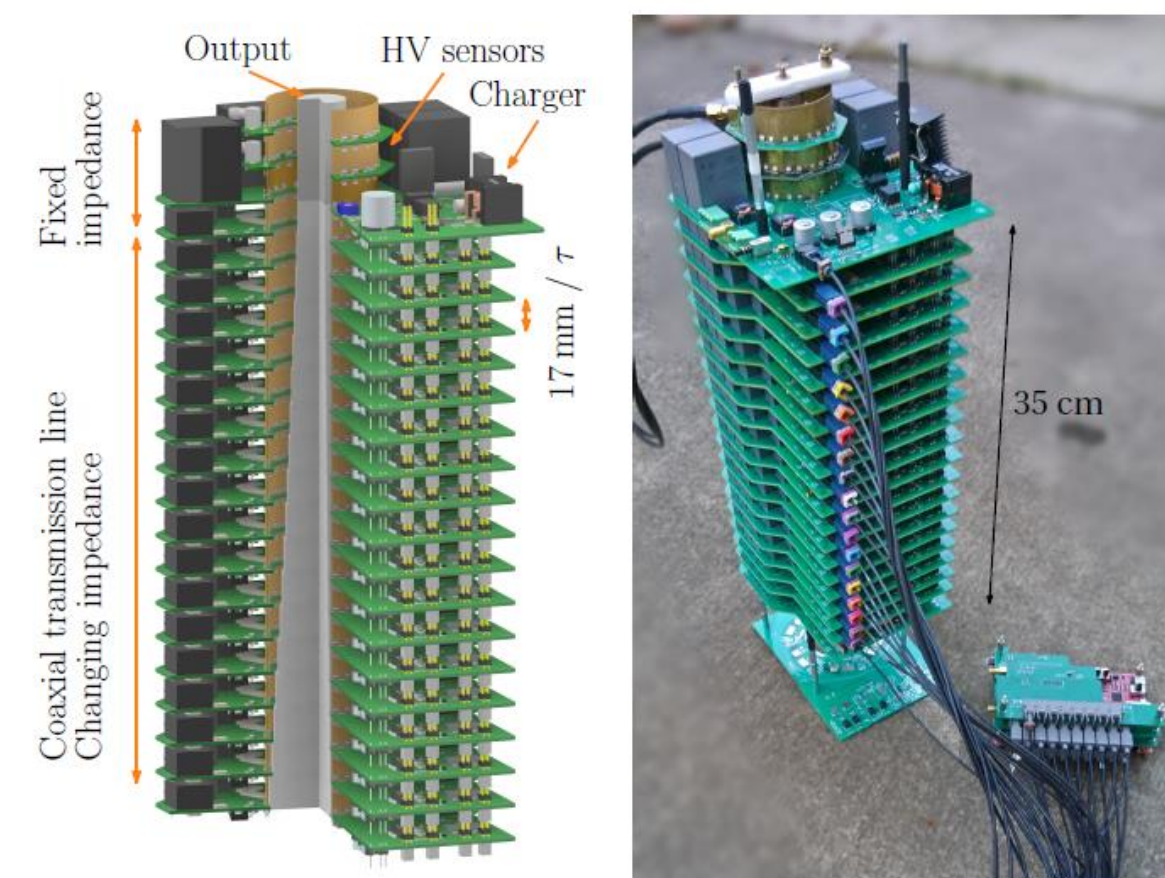


Fig. 2: Solid-state pulse power generator.

Why – State-of-the-art pulsed-power generators are not fast enough and are difficult to scale up

- Fast rise time increases the plasma efficiency.
- Faster semiconductor switching speed needed.
- Signal reflections need to be reduced.
- Modular approach essential for scale-up

How – Ultra-fast switched GaN transistors in a modular impedance-matched structure

- GaN transistors are used, which require a lower gate charge, hence allow to switch faster.
- Novel optimized gate driving techniques to further improve switching speed.
- Module-based approach through impedance-matched structure, avoiding signal reflections (Fig. 3 & Fig. 4).

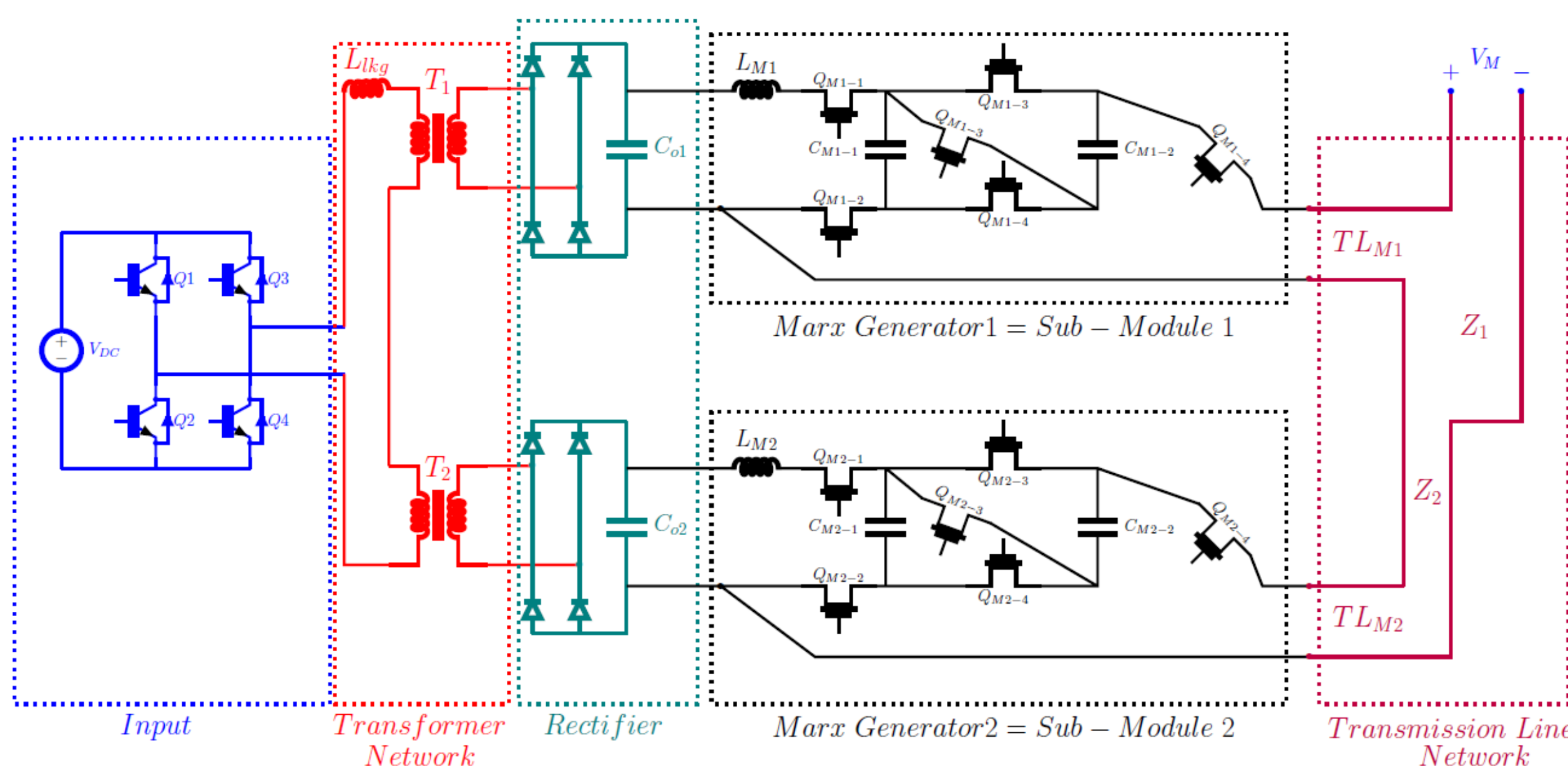


Fig. 3: Proposed pulsed-power generator based on combined charging method.

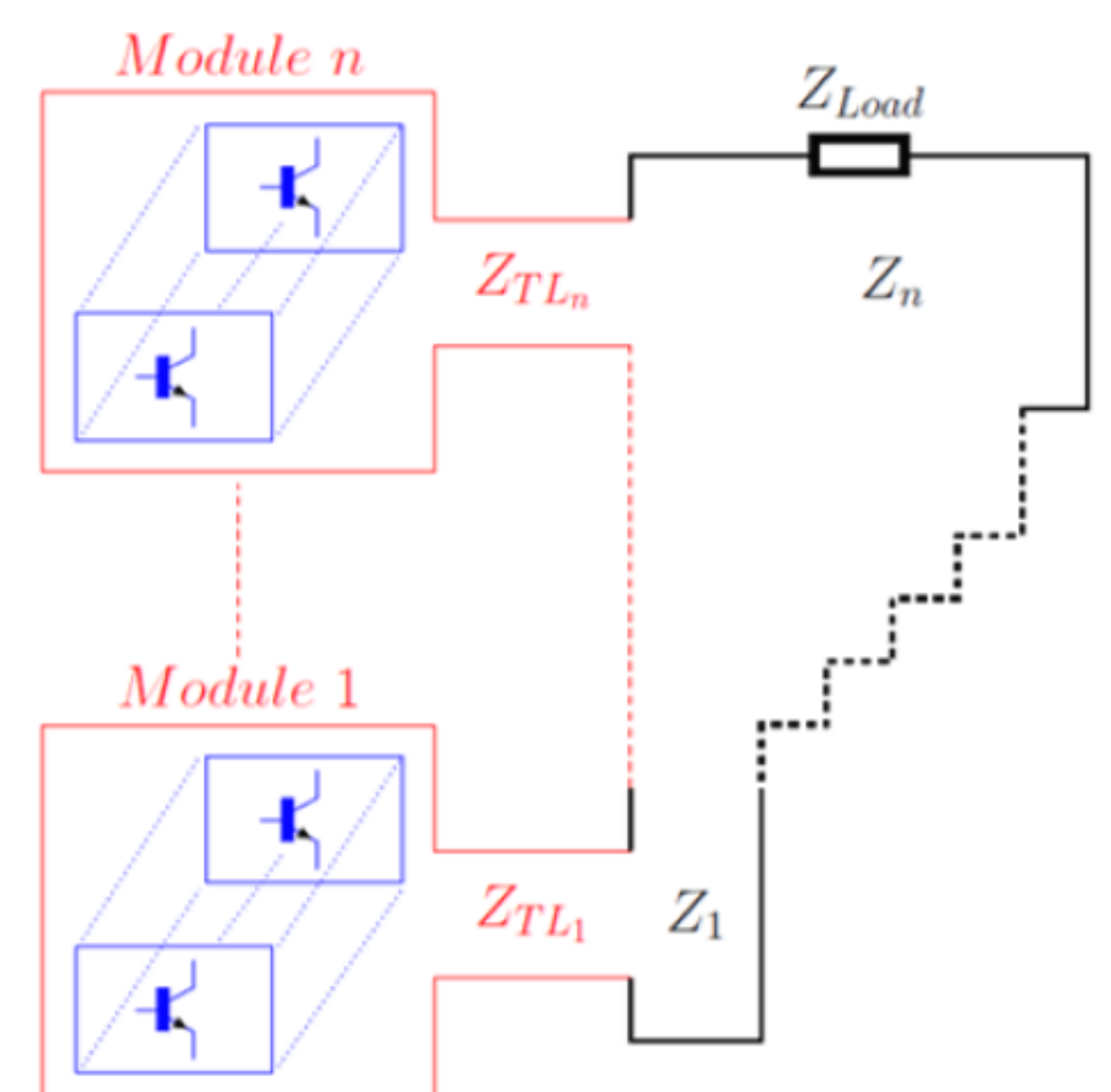


Fig. 4: Proposed structure for the modular system.