

# Radiating broad-band pulse generator with corona charging mechanism

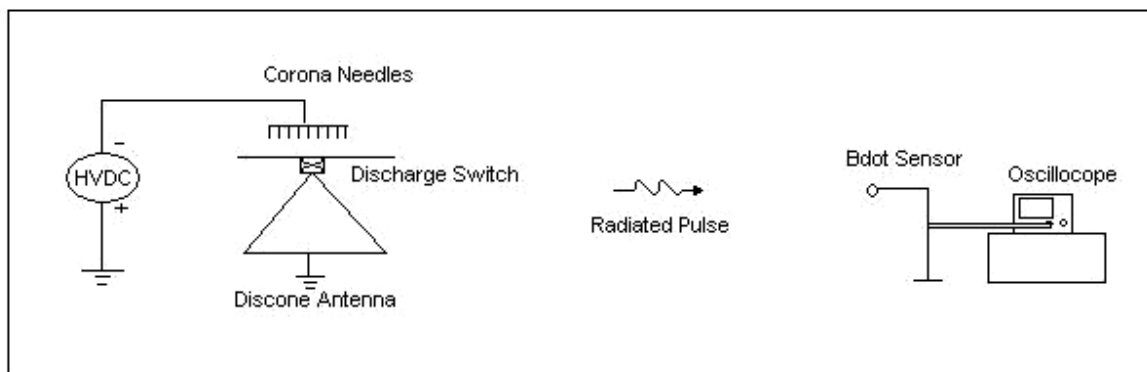
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A radiating pulse generator conformed by a discone antenna fed by a corona source is proposed. The electromagnetic pulse generator consists of a broad-band impulse radiating antenna (IRA) connected to a gas-discharge switch. The antenna behaves as the charge-holding element avoiding the need of an external capacitor. The discone antenna is connected to a switch, as indicated in Fig. 1. The cone element of the antenna is grounded, while the disc element is a floating electrode: the switch isolates it from the ground. The floating disc element is charged by the corona-needles source. The deposited electrical charge on the floating disc electrode raises its potential to several kilovolts. Once the voltage across the switch reaches its breakdown threshold, the floating disc element will discharge to ground radiating in the process a clean, broad-band damped-sinusoidal pulse. Corona charging mechanism provides independence of the radiating system from the primary source because they are DC isolated. One of the main advantages of this device is the low inductance of the discharge path. For this reason, extremely fast impulses can be produced [2]. Thus, repetition rates around hundreds of Hz can be achieved. This novel charging mechanism is a simple alternative to inductor or transformer-based charging systems that require special precautions to prevent arc-breakdown between adjacent loops in the coils [1]. A prototype of the proposed pulse generator was constructed using a pressurized-air switch. Measurements with a B-dot sensor show that the generator is able to produce pulses in the tens of volts per meter at 20 m with a repetition rate around of Hz when charged with a high-voltage DC source.



**Fig. 1 – Schematic representation of the experimental set-up. Notice the discharge switch between the two elements of the discone antenna. The antenna disc is fed by a corona source. A B-dot sensor registers the radiated emission of the radiating broad-band pulse generator.**

## References

1. K. D. Hong, S.W. Braidwood, "Resonant Antenna-Source System for Generation of High-Power Wideband Pulses," IEEE Transactions on Plasma Science, vol. 30, 2002.
2. F.J. Roman, "Effects of Electric Field Impulses Produced by Electrically Floating Electrodes on the Corona Space Charge Generation and on the Breakdown Voltage of Complex Gaps," Comprehensive Summaries of Uppsala Dissertations from the Faculty of Science and Technology 246, ACTA UNIVERSITATIS UPSALIENSIS, UPPSALA 1996.