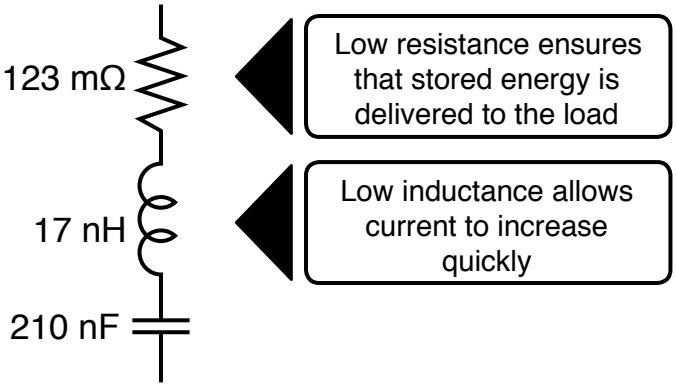
HURON
ENERGY STORAGE CAPACITOR

HURON is an energy storage capacitor optimized for delivering high current. Low inductance allows the current in a circuit to increase quickly while low resistance ensures that the stored energy is delivered to the load. Standardized busbar terminals speed up assembly of experimental setups so that data can be collected faster. Experimental results are transparent with an accurate electrical model.

SPECIFICATIONS

Maximum Continuous Operating Voltage	50 kVdc
Maximum Peak Current	70 kA
Capacitance	210 nF
Equivalent Series Resistance	123 mΩ
Equivalent Series Inductance	17 nH
Maximum Stored Energy	260 J
Lifetime	10^5 shots at 50 kVdc, 40 kA, 20% reversal 10^3 shots at 50 kVdc, 60 kA, 75% reversal
External Dielectric	Oil above 30 kV at 7000 ft Oil above 40 kV at sea level Air otherwise
Mass	7.5 lb / 3.4 kg
Dimensions	6.0 x 11.2 x 2.3 inches / 15 x 28.5 x 6 cm

RLC Equivalent Circuit Model



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WHAT HURON WILL DO FOR YOU

Maximize Magnetic Pressure

Magnetic pressure and current go hand-in-hand, so magnetically driving plasmas or solid materials is only possible when every barrier to current is removed. Resistance and inductance impede the flow of current and prevent reaching high magnetic pressures. A capacitor is capable of delivering current with magnitude limited only by the impedance of the external circuit and the capacitor's own Equivalent Series Resistance (ESR) and Inductance (ESL), so for circuits with negligible impedance, capacitor ESL and ESR are critical parameters. When the impedance of the external circuit is non-negligible, a capacitor with high DC voltage rating is needed to force the high current necessary to the production extreme magnetic pressure.

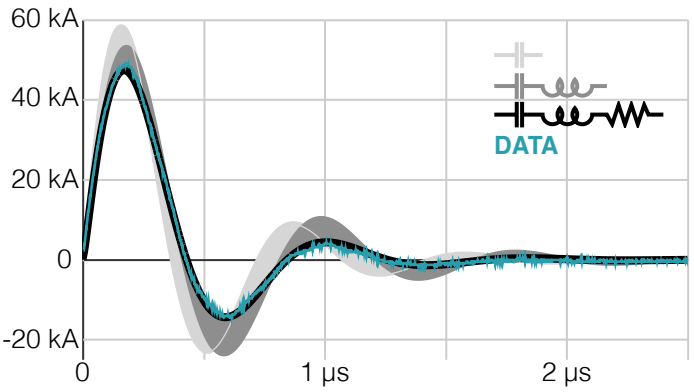
Quantify Nonlinear Loads

Impedance as a function of time is data critical to understanding the behavior of complex electrically-driven systems. This information provides a window into the internal processes taking place and allows the electrical energy deposited into a system to be quantified. In principal, these data may be collected by measuring both the current through a load and the voltage across the load, but measuring high voltages with variations on the timescale of nanoseconds is nontrivial. A more accurate approach is to use components characterized by accurate electrical models so that the impedance of the load being driven is the only unknown. The complete electrical behavior may then be inferred from the current through the circuit which is significantly easier to measure than voltage.

Safely Generate Shock Waves

Electrically driven shock waves are inherently safer to study than those driven by chemical explosives because handling chemical explosives always carries an element of danger whereas capacitors are inert except when charged. However, only capacitors with low ESR are capable of delivering significant energy to the low-impedance loads typical of shock physics experiments. ESR robs energy from a pulse and converts it to waste heat in the capacitor. If the impedance of the load is comparable with the ESR of the capacitor then only half of the energy stored in the capacitor will be delivered to the load.

Comparison of Equivalent Circuit Models



Quickly Build Circuits That Work

High peak current and fast rise time is only possible when total circuit inductance is minimized. Just a few inches of wire adds 100s of nH of inductance making wire unsuitable for connecting pulsed power components. Parallel plate transmission line and stripline offer much better performance than wire, but custom-fabricating these interconnects slows down experimental progress. Experiments move faster when components with standardized busbar connectors are used.