



RPM

RING POWER MULTIPLIER



Advanced Grid
Conditioning & Stability

The Problem



“The world economy loses billions of dollars each year due to power outages and equipment failures caused by poor power quality.”

The Need

The world economy loses billions of dollars each year due to power outages and equipment failures caused by poor power quality. Surprisingly, over 90% of the cascading failures occur as a result of power disturbances or interruptions that last less than 5 cycles (less than one tenth of a second).



Why It Occurs

The most reliant power grids have baseload generation and gas-turbine spinning reserve (which take tens of seconds to minutes to respond). There is really no energy storage technology today that can store electrical energy and deliver massive amounts of power instantaneously (in a fraction of a cycle to a few 100 cycles) at power levels of 100's of MW to GW.

Limitations of Existing Technology

Traditional systems, such as; flywheels, batteries, super-capacitors, and SMES, all have to go through AC-DC-AC conversion to produce real AC 50/60 Hertz power. The three main problems associated with these traditional forms are the following:

- Time - Often the precious milliseconds of the conversion process results in cascading failures
- Energy Losses - All known forms of energy conversion and storage result in energy losses
- Power Level Limitations

These limitations will continue to cost world economies billions of dollars each year and will impede the development of upgraded power grids.

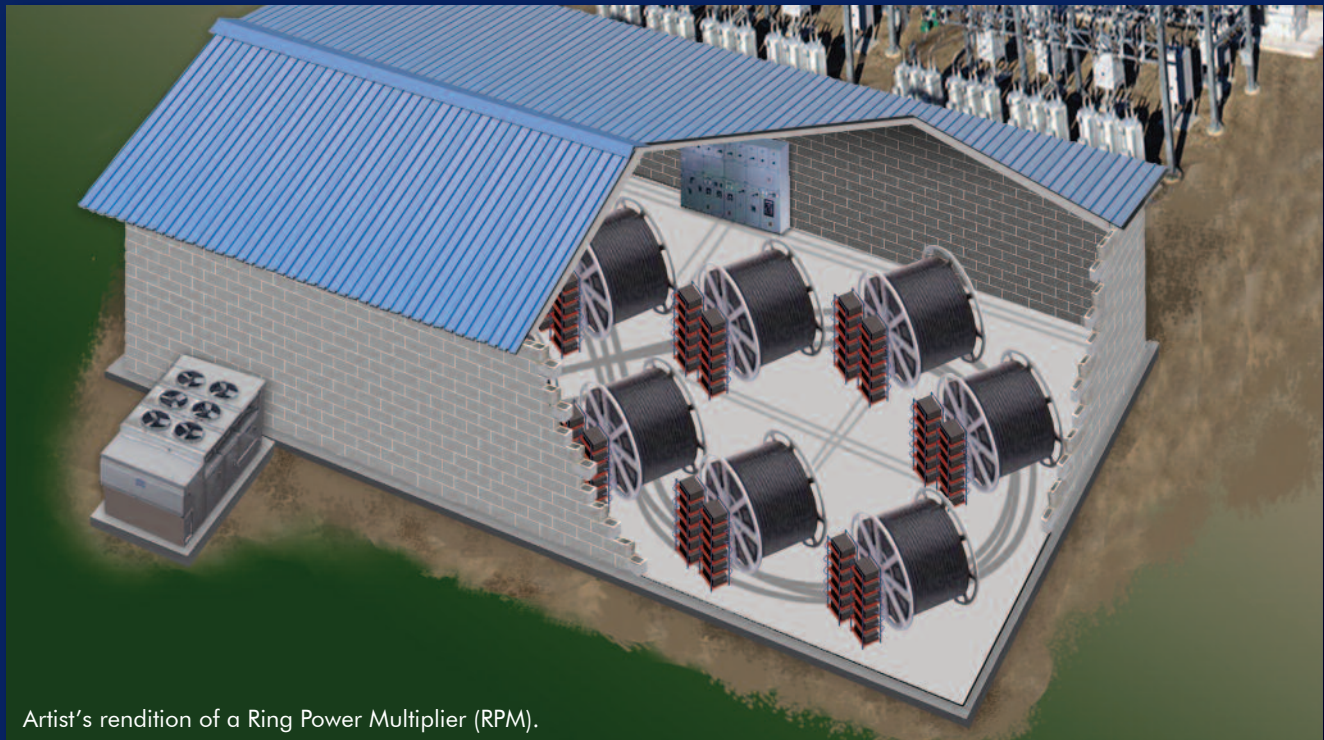
The Solution

The Ring Power Multiplier (RPM) is a system that can integrate with existing technologies and can act as a "shock absorber" or "elastic reservoir." The RPM:

- Acts as a "shock absorber" or "elastic reservoir"
 - Overcomes the destabilizing effect of wind and tighter grid margins
 - Can be charged or discharged rapidly
 - Uses many types of energy sources
- Offers continuous, instantaneous power protection
 - Provides constant voltage, frequency and amplitude throughout discharge
- Provides virtually limitless charge and discharge cycles
- Is deployed at site or grid level
 - Highly scalable
- Can be used continuously
- Could be utilized strategically and dispatched only in grid emergencies
- Integrates with conventional storage systems – Provides long term low cost storage and load shifting



RING POWER MULTIPLIER



Artist's rendition of a Ring Power Multiplier (RPM).

The Invention

The ONLY known system for power conditioning and energy storage that:

- Does not require AC-DC-AC conversion (stores AC power as real AC power--current and voltage in-phase at 50/60 Hertz).
- The cryogenic version has virtually no storage losses.

The Ring Power Multiplier is based on the principle of storing energy as real AC power in a "traveling electro-magnetic wave."

The ability of the RPM to clean (get rid of essentially all harmonics), magnify power, and store energy as a traveling electro-magnetic wave enables it to react instantaneously as a continuous "elastic reservoir", which makes it the ABSOLUTE solution for the Smart Grid.

NASA Independent Verification at 400 Hz

Several large (20ft x20ft) 400 Hz working systems were financed and developed under a NASA contract for the MSFC Maglifter project, which also served as the proof of concept demonstrator. In all, eight prototypes were built, testing out various components and configurations from one to four wavelengths, as well as subharmonic operation down to 100Hz.

Actual NASA Test Model Demonstrated:



- **Power multiplication**
- **Energy storage**
- **Power smoothing**
- **Instantly available**
- **Frequency regulation**
- **Negligible losses**
- **No moving parts**
- **Compact design**
- **Highly scalable**



The Global Impact

Global grid operators need a solution for preventing black outs, power and equipment failures, as well as the delivery of renewables, while ensuring grid stability. Electricity markets are rapidly growing and concerns over climate change are intensifying around the world, particularly as Asia and Africa require more energy.

Customers include: power generation, transmission, distribution and system operators; wind power developers; owners and financiers of large commercial buildings and industrial plants which require clean power and/or uninterrupted power transmission; owners and operators of large data centers; and the insurance industry.

Global Markets

- Power Generating Authorities
- Transmission and Distribution
 - Network stability
- Renewable Power Developers
 - Wind, solar
- Large Commercial & Industrial Users

Renewable Energy & Grid Stability

The reduction of carbon emissions from the power sector is now an urgent global priority. Renewable energy solutions, such as solar PV, geothermal and wind, are rapidly being integrated into the supply mix. These alternatives destabilize the grid.

The RPM is the only known energy storage system that stores AC power as real AC power at 50/60 Hz, which is instantaneously available, and can be deployed across an entire network, acting as an elastic reservoir.



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The Inventor

The Ring Power Multiplier, a breakthrough power conditioning & energy storage device, was invented by Dr. James Corum: Inventor, engineer, scientist and physicist.

Dr. James F. Corum: Ph.D. in Electrical Engineering from Ohio State University (1974), MSEE from Ohio State (1967), and BSEE from Lowell Technological Institute (1965).

Dr. Corum taught and conducted research in electromagnetics, antennas, RF telecommunications, astrophysics (radio astronomy), mathematics (tensors and differential geometry) and relativistic electrodynamics for 17 years in academia before turning to private industry.



Dr. Corum was cited as a "National Treasure" by The Office of the US Secretary of Defense for his work on the DARPA National Panel of Radar Experts on Ultra-WideBand Radar and Phenomenology. His electromagnetic research has been recognized by prestigious scientific organizations and professional societies around the world.

- Electronic Engineer for the National Security Agency and a Researcher at the Ohio State Radio Observatory
- Tenured Associate Professor on the faculty at West Virginia University
- Professor at The Ohio Institute of Technology
- Senior Scientist at the Battelle Institute in Columbus, Ohio
- Chief Scientist at Scientific Applications and Research Associates, Inc., in Huntington Beach, CA
- Chief Scientist for the Institute for Software Research, in Fairmont, WV
- Currently, he is Chief Technical Officer for CPG Technologies

- Senior Member of the Institute of Electrical and Electronic Engineers
- Chairman of the Upper Monongahelia Subsection of the IEEE
- Board Member of the Pittsburgh Section of the IEEE
- Member of the American Geophysical Union, the American Association of Physics Teachers, the American Institute of Aeronautics and Astronautics, the American Society for Engineering Education, the American Association for the Advancement of Science, and the Research Society of North America
- Who's Who in Engineering
- Who's Who in American Education, Leading Consultants in High Technology
- Who's Who of American Inventors
- Who's Who in Science and Engineering

Dr. Corum has published over 100 notes and technical papers in prestigious scientific magazines.

- Holds 5 patents (he invented the contra-wound toroidal helix antenna technology)
- Has consulted for private industry and for DARPA, DoD, DIA, IDA, NRO, CIA, AFOSR, NEODTC, ARO, NASA, NIOSH, DOE and other governmental agencies.



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