HIGH PERFORMANCE RESONANT POWER SUPPLIES

Comprehensive power supply technologies developed in the AGH University of Science and Technology (Krakow, Poland)

EMC COMPLIANCE

- Why?
  - To make EMC compliance easier
- How?
  - Sinusoidal currents
  - Uninterrupted current flow
  - Zero Voltage Switching
  - Highly isolated DC/DC utility power converter to minimize conducted disturbances
  - Quality factor limiter, damping (not clipping) the amplitudes of sinusoidal currents

NEW TOPOLOGIES WITH QUALITY FACTOR LIMITER

- Why?
  - To provide energy-aware hardware overcurrent and overvoltage protection
- How?
  - Almost lossless recirculation of excess energy during transient states back to the power source
  - Reduction of quality factor resulting in damped rather than clipped currents
  - Two new topologies with an integrated quality factor limiter: series-parallel LCLC and series-parallel LLC

INTEGRATED MAGNETIC ELEMENTS

- Why?
  - Smaller dimension = less weight = cheaper final product
- How?
  - By reusing the ferromagnetic core material
  - P<500W, f<300kHz
  - Magnetic element with orthogonal fields
  - Shaping two magnetic flux density vectors to be orthogonal in time and space, so that the resulting B field vector is always constant in amplitude
  - P>500W, f<400kHz
  - Integrated multi-winding inductor
  - Shaping two magnetic flux density vectors to be antiparallel where possible, so that heat losses are more evenly distributed over the core material

MULTI-OUTPUT HIGHLY ISOLATED DC/DC CONVERTER

- Why?
  - To easily power the gate drivers
- How?
  - Multi output is cost effective
  - High isolation (>3kVAC)
  - Low parasitic capacitance: in-out < 15 pF
  - Improves reliability and makes EMC compliance easier
  - Soon to be patented

Patent pending technology

CLEVER CONTROL

- Why?
  - To improve efficiency at small and medium loads
- How?
  - By reducing switching losses through omitting switch commutation when not needed