

Simulation for Fuel Cell Inverter using Simplorer and Simulink

Ansoft Alternative Power
Simulation Workshop

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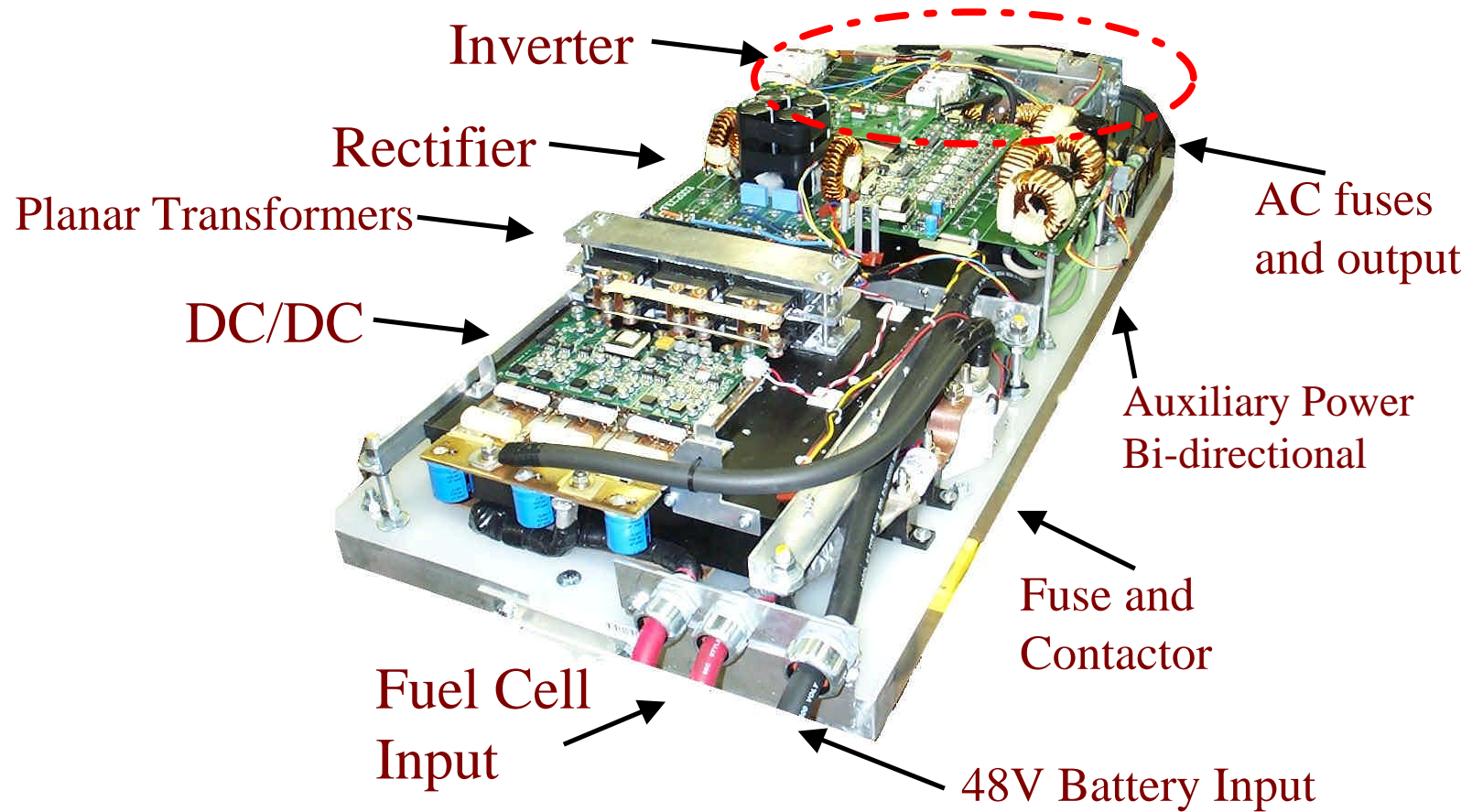
Design Goals

- Design power stage and control for 10kW fuel cell inverter
- Reduce cost by eliminating expensive sensors and transformers, this complicates control
- Reduce design iterations by simulating actual control on a better inverter model

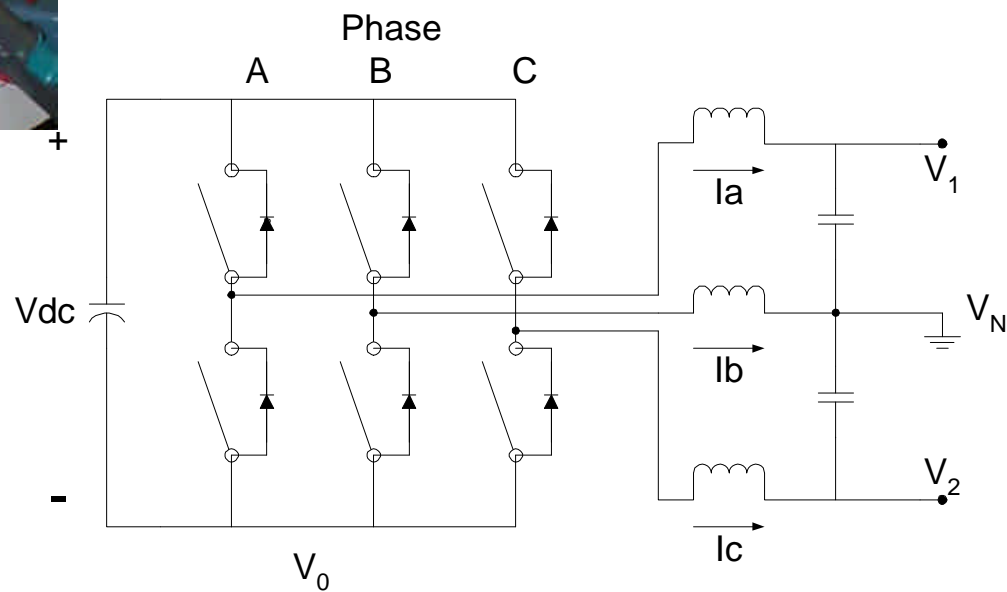
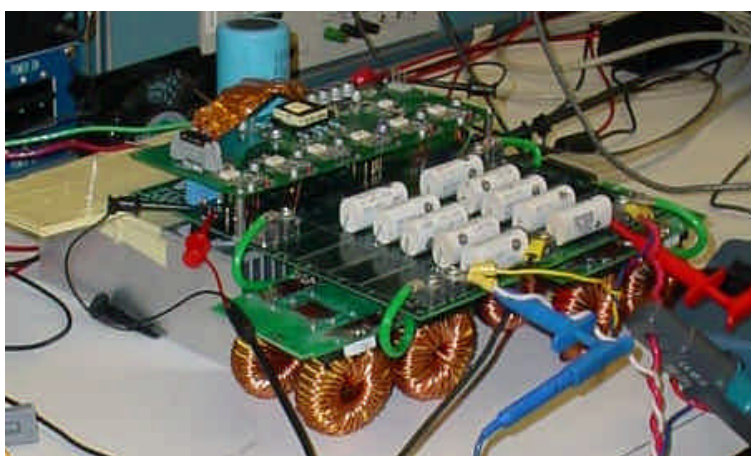
Challenges

- Multiple input multiple output (MIMO) system makes control design and implementation difficult
- Theoretical inverter model lacks real-world problems like parasitic losses, switching noise, and non-linear loads

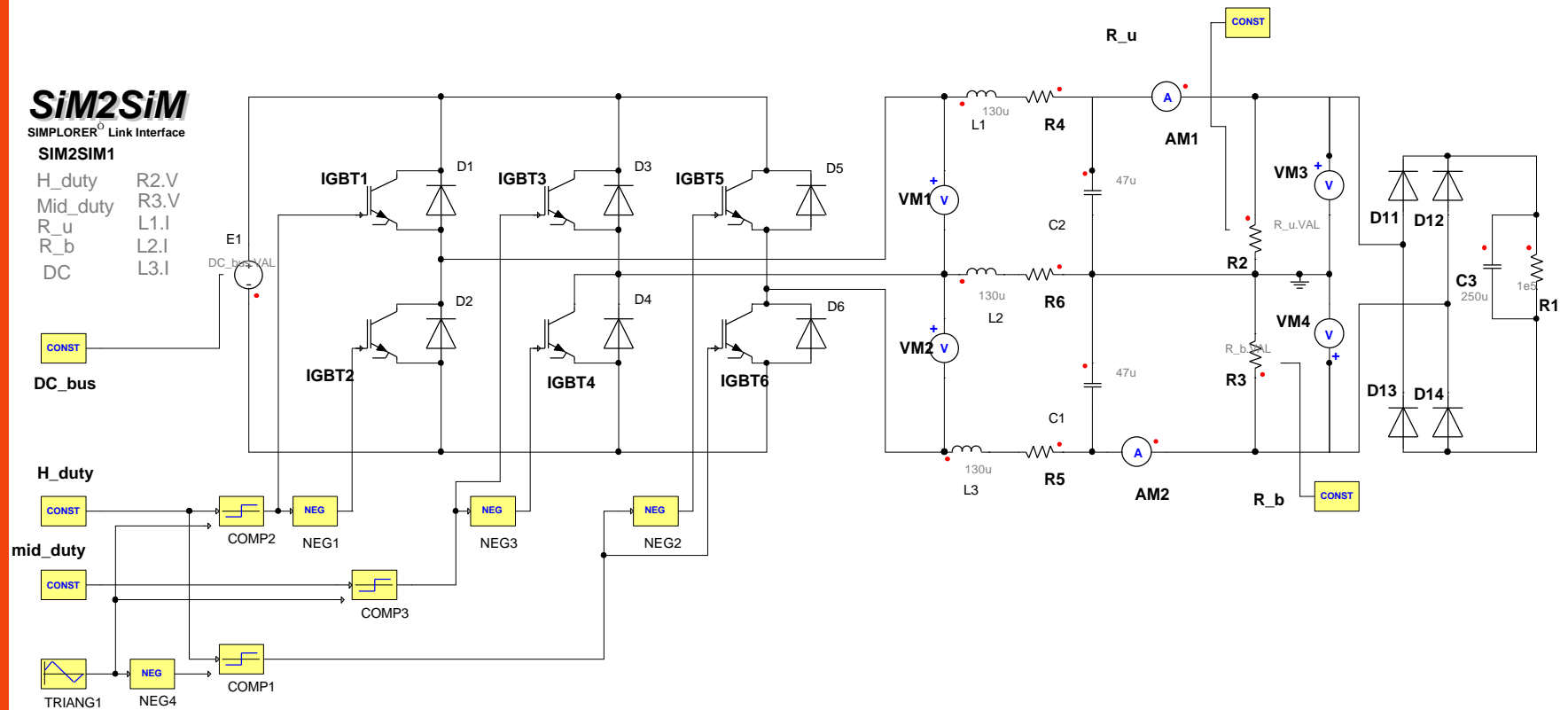
System Topology



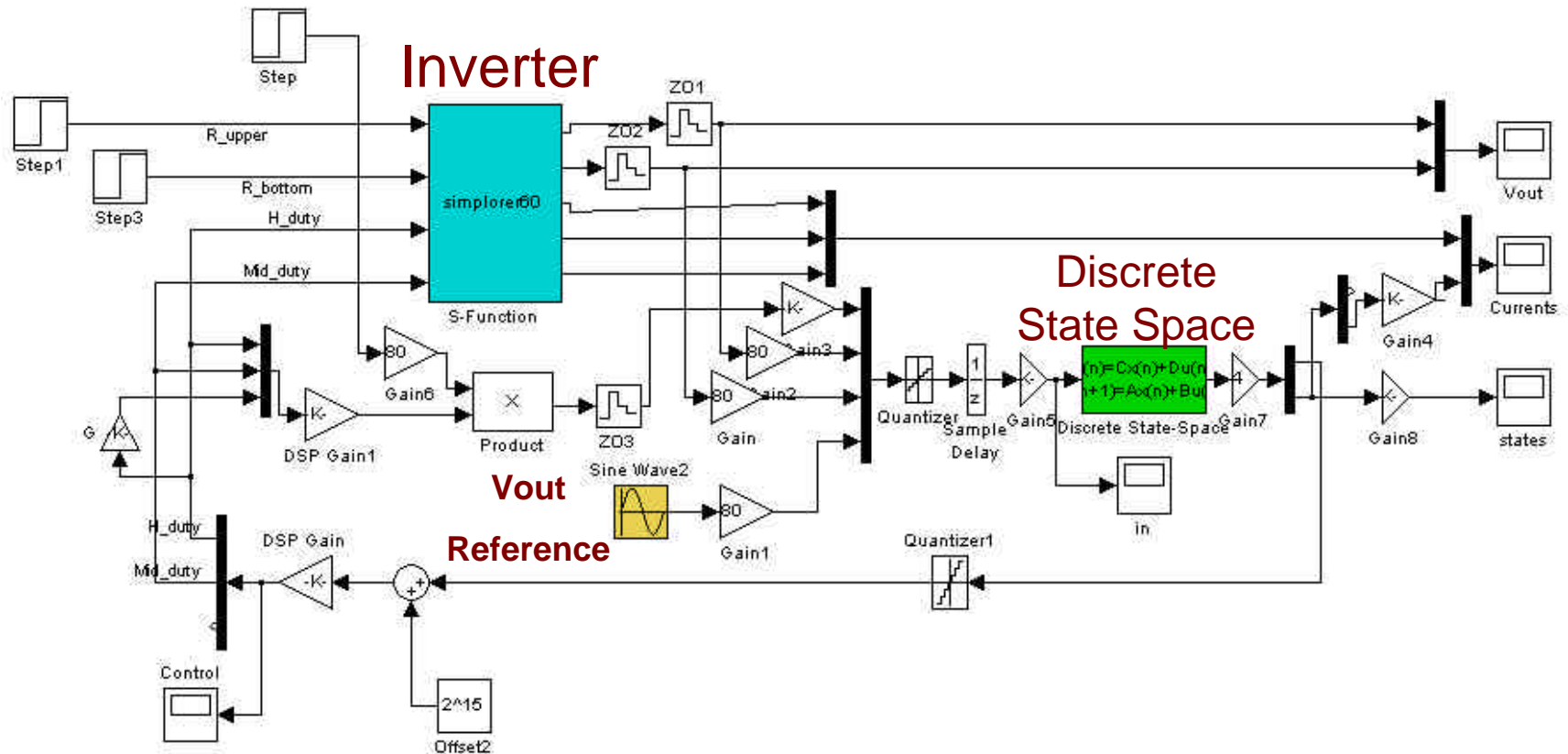
Inverter Topology



Simplorer Integration Example



Simulink Integration Example

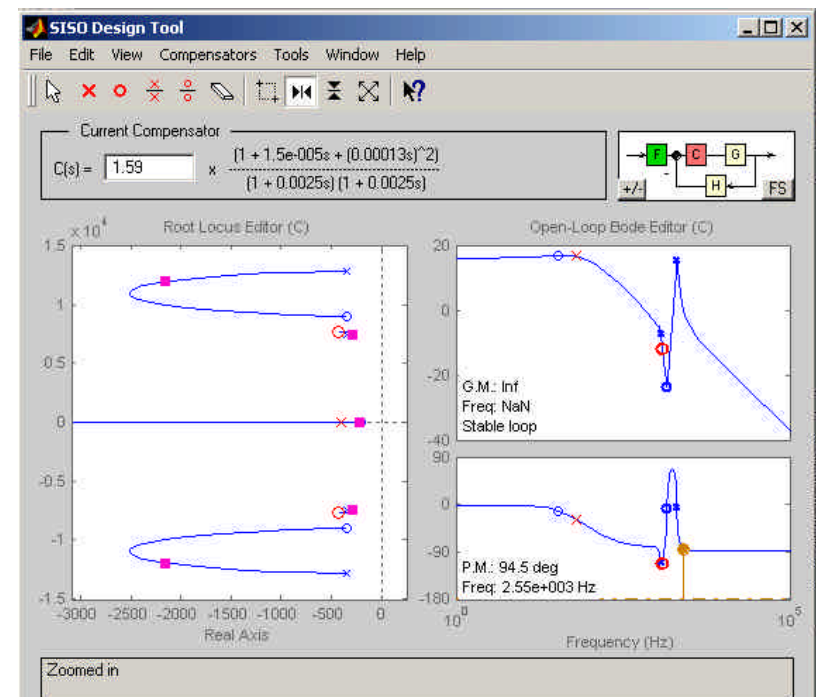


SIMPLORER

- Easy to use, no theoretical analysis
- Short learning curve
- Stable
- Specifically developed for complex electrical systems i.e. inverters

SIMULINK and MATLAB

- Allows for complex controller design and implementation
 - Linear Quadratic Regulator (LQR)
 - Kalman Filter
 - Dual loop systems
 - Discrete systems
 - Fixed point controllers
 - Quantization errors



Conclusion

- Simplorer improves inverter modeling for Simulink control design
- Simplorer and Simulink integration helps design a better inverter and controller

Questions?

