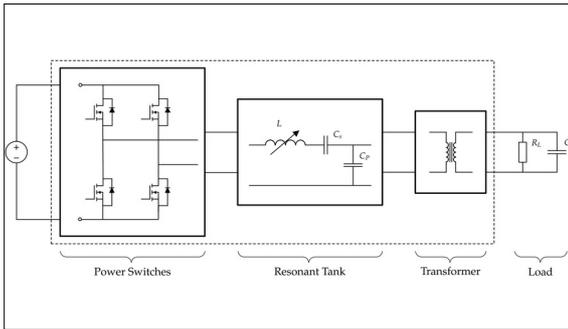




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Modular Sinusoidal HF-Voltage Source with variable Output Frequency



Schematic representation of a resonant circuit module
Eigene Darstellung

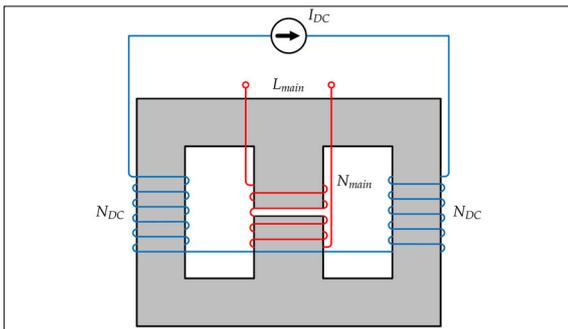
Problemstellung: The purpose of this project work is the investigation of a modular resonant inverter with a variable output voltage frequency. The project includes a study of the frequency variation methods, resonant inverter design and hardware design.

Vorgehen: A mathematical model of the resonant inverter was built in order to analyse the resonance circuit behaviour. In combination with a PLECS simulation, the components of the resonant tank were designed. The resulting component values were used to design the hardware modules. The hardware was implemented in form of a self-developed 4 layer PCB, which was designed with OrCAD.

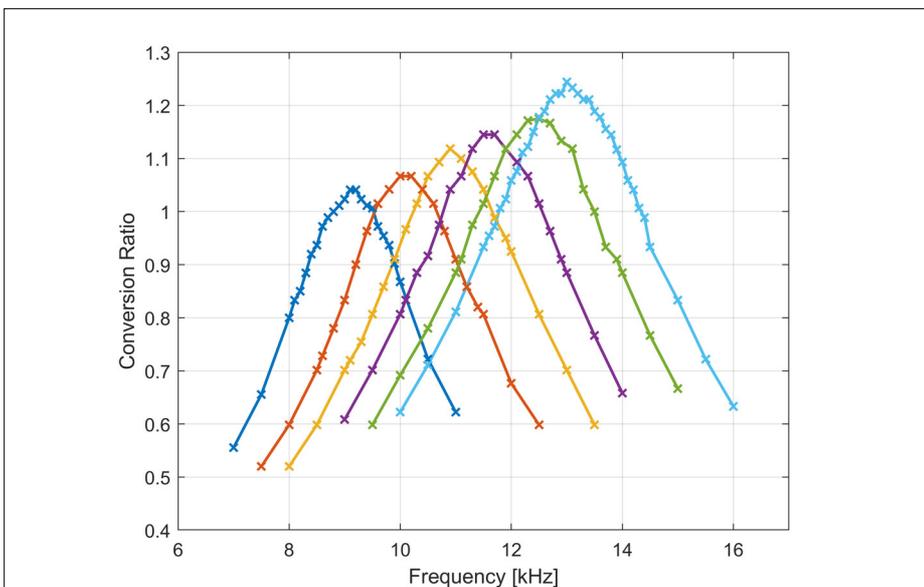
Different frequency variation methods were examined and the variable inductance approach was used. In order to implement the variable inductance, a design procedure was created. This procedure was evaluated with a variable inductance prototype. With this prototype the design procedure could be verified. Finally, the variable inductance was implemented and tested.

The control of the hardware was implemented with the RT-Box of Plexim. A simple integral control system was implemented in order to control the inductance and output voltage level.

Ergebnis: The resonance circuit measurements showed similar behaviour as in the simulations. In combination with the variable inductance, the frequency variation of the whole system could be verified. With three modules connected in series, the modular functionality was tested and showed good sinusoidal output voltage results. The control of the resonant inverter proved to be difficult due to the link between inductance and output voltage. However, the implemented control strategy showed satisfying results.



Variable inductance schematic with the different windings on an E-core
Eigene Darstellung



Modular conversion ratio measurement of three hardware modules connected in series
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