Development of a SiC-Based Inverter with Adjustable Voltage Slopes

Next generation semiconductors such as silicon carbide (SiC) and gallium nitride (GaN) provide much faster switching characteristics and lower losses compared to silicon-based semiconductors, allowing a more compact design. This enables higher switching frequencies with lower losses and thus, a higher power density and efficiency of power electronics. However, the steep voltage slopes associated with the fast switching characteristics lead to accelerated ageing of insulation materials. This causes premature failure of the insulation system of electrical equipment.

In order to investigate the influence of the voltage slopes on insulation materials more in detail, a SiC-based converter with adjustable voltage slopes is to be developed and tested within the scope of this work. The steepness of the voltage slopes should be variable. This work is especially suitable for students who enjoy hardware development.

Basic experience in hardware construction and circuit design are advantageous.