



Modulation Strategy Impact of BEV Inverters on the Voltage Ripple and the High-Voltage Traction System Stability

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Abstract:

Modulation strategies of traction inverters have a high impact on the efficiency and voltage utilization of the electric drivetrain. An often underestimated effect that comes along with various modulation strategies is their diverging impact on the resulting voltage ripple within the High-Voltage (HV) traction system. The voltage ripple in the first place, but also the DC-side current ripple can be considered as the stability criteria of a HV traction system, which depend upon the DC-link current and the HV system impedance.

Since the voltage ripple is the main DC-link capacitance design requirement, the DC-link current harmonics of each modulation strategy have to be analyzed in detail as well as their application range within the torque-speed diagram of an electric drive. The target is to design an ideal DC-link capacitance for each inverter within an electric platform. Therefore, we will discuss the challenge of combining the voltage ripple requirement of different modulation strategies with various HV traction systems.

Curriculum Vitae:



Cornelius Rettner is a power inverter Systems Engineer at Group Components, Volkswagen AG in Ingolstadt. He is responsible for the High-Voltage simulation and the EMI design of traction-inverters.

He was born on 30th July 1991 in Schweinfurt and received the B.Sc. and the M.Sc. degrees in electrical engineering, electronics, and information technology from the University of Erlangen-Nuremberg (FAU), Germany, in 2014 and 2016, respectively.

Cornelius Rettner started his professional career at AUDI AG, Ingolstadt as a PhD student in cooperation with the Chair of Power Electronics (LEE), FAU Erlangen-Nuremberg in 2017. From 2020 to 2022, he worked at AUDI AG as a Research and Development Engineer in the Power Electronics Hardware Design before he joined Group Components, Volkswagen AG in 2022.

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