

Performance Improvement of AC Drives by High Power Converters

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Abstract: High performance AC drives fed by power electronic converters are a key component of the high-tech sector's efforts to reduce energy consumption and increase productivity. The converter topologies, modulation methods, control and estimating approaches, as well as other important components of controlled induction motor drive systems, are reviewed in this study along with current state and tendencies in development. The enumerated topologies are described: Current source converters, direct converters, and two- and multi-level voltage source converters. Traditional bipolar and unipolar PWM, space vector modulation (SVM) with extension for multilevel converters, harmonic control techniques, and variable frequency modulation (hysteresis, nearest level, and model predictive algorithms) are a few of the modulation techniques that are briefly covered. Regarding the control techniques, the two categories of generic torque control methods—linear controllers and nonlinear controllers—are explained. When 4500-V gate turn-off (GTO) transistors became widely available on the market in the middle of the 1980s, the development of high-power converters and medium-voltage (MV) drives began. Up until the introduction of high-power insulated gate bipolar transistors (IGBTs) and gate-commutated thyristors (GCTs) in the late 1990s [2, 3], the GTO served as the industry standard for the MV drive. Due to their excellent switching properties, lower power losses, simplicity of gate control, and snubbers operation, these switching devices have quickly advanced into the key areas of high-power electronics

Keywords: High Power Converter, Boost Converter, AC Drive, Power Electronics Circuits

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