An Study of the Reduce Common-Mode Voltages and Electromagnetic Interference in PWM Inverter Fed Induction Motor Drive Using a Soft-Switching Technique

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Studies demonstrate that the performance of PWM inverter systems improves by increasing frequency. However, the increased frequency will rise the switching losses, the switch stress, and especially the electromagnetic interference (EMI). The modern design of electrical systems requires that these systems be compatible with the surrounding electromagnetic environment which includes electromagnetic radiation or noise sources. The design should able to produce less disturbances in the system and minimizes damage to system performance. Using converters' topologies with hard switching technique causes high switching losses, electromagnetic interference and undermines efficiency. A hard switching refers to a switch the power supply voltage is fully placed on transistors and thyristors when switching each phase. In this way, the switches will have significant losses, and this results the efficiency of the converter degrade. When switching performes at zero-current switching, in this case, there are no losses on the switches that is called the soft switching. In these converters creates resonance when switching on the circuit using other elements and cause reduced at zero-current switching. In the last decade, a lot of research has been done to find a solution for the switching losses, EMI and common-mode voltage. Among them, a soft switching resonant dc-to-dc converter are widely used in induction motors, which has high voltage in the frequency link (greater than twice the supply voltage).

Keywords : Motor Drive Systems, Inverter, PWM, Common-Mode Voltage, Electromagnetic Interference, Total Harmonic Distortion, Loss Reduction