
Departmental Seminar

Seminar Title	: Comprehensive Analysis and Modeling of Totem-Pole PFC Rectifiers Using Various Modulation Techniques for EV charging application
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Venue	: Seminar Room (EE-205)
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Abstract	: Electric vehicles (EV) have a huge positive environmental impact, such as reducing carbon emissions, the greenhouse effect, and air pollution. The EV chargers available in the market are mostly two-stage chargers where the first stage is the PFC rectifier stage used for regulating the DC Link voltage, and the second stage may be a non-isolated or an isolated DC/DC converter for charging the EV battery. This paper concentrates only on the first stage, i.e the PFC rectifier. Here, a detailed analysis and modeling of a Totem-Pole PFC rectifier with different pulse width modulation (PWM) strategies have been presented, to maintain the DC-Link voltage. A 3kW Totem Pole PFC rectifier has been designed using MATLAB Simulink to study the impact of the different modulation strategies on the harmonics of the grid side current. When charging an EV, the load current varies with different modes of CCCV charging, hence the impact of the load current variation on the DC-Link voltage has also been analyzed with the above PWM strategies. Finally, a comparison of the modulation strategies has been done based on switching loss, total harmonic distortion (THD) level of the grid current, input power factor and the dynamics of the system.