

Departmental Seminar

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Seminar Title : Generalized Average Modelling & Singular Perturbation Analysis of DAB  
Speaker : Gaurav Kumar (520ee1015)  
Supervisor : Dr. Shubhobrata Rudra (9051217543)  
Venue : Seminar Room, EE-205  
Date and Time : 27 Dec 2024 (03:15 PM)  
Abstract : The primary focus of the research is bidirectional DC-DC dual active bridge (DAB) converters, dynamic analysis and comprehensive continuous-time average modelling. It isn't easy to model these converters since the transformer current is completely alternating in nature. A full-order continuous-time average model is proposed, with DC components and first-order terms of transformer current and capacitor voltage serving as state variables. The outcome is a model of the third order when the capacitor's equivalent series resistance (ESR) is ignored and a model of the sixth order when ESR is considered. Specifically for DAB converters, the research constructs a control-to-output-voltage transfer function. It also investigates a unique perturbation analysis in search of circumstances that permit the disentanglement of rapid and slow state variables. According to the experimental data, incorporating the capacitor ESR improves the proposed model's accuracy in predicting the smallsignal frequency response.