IEEE Southeastern Michigan Section in collaboration with

Presents: Dr Jinia Roy

Advances in Modular Multilevel Converters through Innovative Circuit Design and Control Strategies

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Modular Multilevel Converters (MMCs) are pivotal in high-voltage applications such as HVDC transmission, renewable energy integration, and medium-voltage motor drives due to their modularity and superior controllability compared to conventional power conversion topologies. However, the bulky and costly capacitors in conventional submodules (SMs) of MMCs pose significant challenges in terms of volume, weight, and efficiency, often accounting for more than 50% of the converter's weight and 80% of its volume.

In this talk, Dr. Jinia Roy will present a novel SM circuit incorporating the Active Power Decoupling (APD) technique to address these limitations through advanced control and circuit design. The proposed APD-SM architecture operates on the principle of redistributing ripple power—predominantly at the line and twice the line frequency—into a dedicated decoupling path. This circuit provides a parallel route for oscillatory current components, effectively offloading stress from the main capacitor and enabling a significant reduction in its size.

Speaker Bio:

Jinia Roy is Thomas A. Lipo Assistant Professor at UW Madison and an Associate Director of Wisconsin Electric Machines and Power Electronics Consortium (WEMPEC). She is currently leading a DoD funded effort on development of light weight high efficiency power management for space applications.

Prof. Roy has been serving as the Regional Distinguished Lecturer for IEEE PELS since 2024. She was the recipient of the 2019 IEEE PELS Prize Ph.D. Thesis Talk. She also was the recipient of the IEEE/PEDES'96 Award for the Best Thesis in Power Electronics from IIT Kanpur, 2013 and two Best Paper Presentation Awards at 'IEEE IECON 2014' and 'APEC 2017'.

***Pre-Registration Required!**
https://events.vtools.ieee.org/m/518573

Quick Summary

- When:
  Date: Dec 2nd , 2025
  Time: 06:00 –7:30 PM (EST/EDT)
- Where:
  Online via Webex

Audience: OPEN to ALL

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