National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: Performance Improvement of Current Controlled BLDC Drive during Motoring and Regenerative Braking Operations
Speaker	: Dr. Monalisa Pattnaik
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Venue	: Seminar Room (EE-205)
Date and Time	: 23 Jun 2025 (5:00PM)
Abstract	: This paper discusses the performance improvement of current controlled BLDC drive during motoring and regenerative braking operations. The BLDC motor drive is modeled to analyze the dynamics and proper design of the speed controller. The drive is fed through a bidirectional converter which is designed to maintain the dc link voltage with reduced battery ripple currents. The developed model is simulated in MATLAB/SIMULINK platform to verify the performance of PI control scheme involving only speed loop and 2-level hysteresis control with both speed and current loops. In first case, during motoring, input speed is taken as a reference, whereas the maximum allowable phase current is the reference in the braking mode to limit the current flow. In second case, input speed is the reference in both motoring as well as breaking modes. The transient and steady-state behaviour of both the controllers during acceleration, deceleration and controlled braking are presented. The simulation results of hysteresis current controller provides better performance with reduced torque ripple during both motoring and regenerative braking modes. This BLDC motor drive can be used for electric vehicle applications and the proposed control scheme will be experimentally verified.