

Title: SRC Task 2111.007: Modeling and Control for Efficient and Stable Integration of Flywheels and Other Fast Storage in Future Electric Energy Systems

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Sponsor: Semiconductor Research Corporation (SRC)

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Description: This research explores the integration of flywheel energy storage systems in power grids for fast time-scale applications, such as frequency stabilization in response to large wind disturbances. Flywheels can respond faster than conventional generators and could stabilize the system in response to a large disturbance until slower generators can respond. Also using flywheels for transient stabilization could have an economic benefit by reducing the wear-and-tear on generators. Power system dynamic models are derived in an automated manner using the Lagrangian formulation from classical mechanics. Non-linear power electronic control of flywheels is designed using sliding mode control and energy based control.