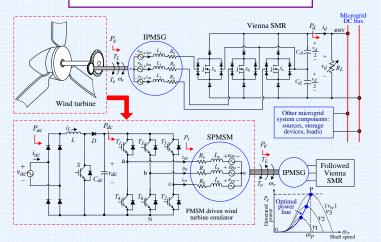
電機控制實驗室 (Electric Machine Control Lab.)

地點: 資電館503室

負責老師: 廖聰明 (C. M. Liaw)

研究項目: Power Converters, Motor Drives, Electric Machine Control

A PMSM Driven Prime Mover Emulator

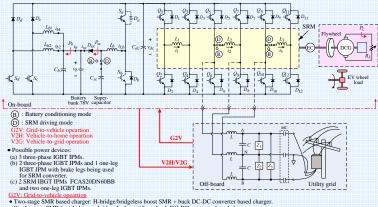


EV Switched-Reluctance Motor Drive with Multiple Functions of Driving/Regenerative Braking, G2V/V2H/V2G

- Motoring mode: voltage boosting, regenerative braking, reversible driving.

- Common DSP for multiple power stage digital controls.
 Charging mode: SMR-based charger is formed by the embedded components to conduct G2V operation.
 Discharging mode: generate 220V/110V 60Hz AC voltages from the battery bank to conduct V2H and V2G operations.

System configuration of the developed EV SRM drive with cascaded battery/SC

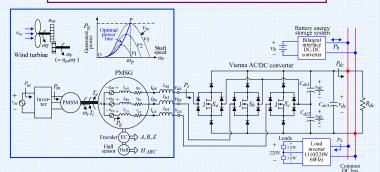


- GZV. Grid-to-vehicle operation
 Two-stage SMR based charger: H-bridge-bridgeless boost SMR + buck DC-DC converter based charger.
 Single-stage SMR based charger: bridge diode rectifier + buck DC-DC converter based charger.
 SING deving: (S_n, D_n, S_n, D_n): form interleaving boost converter (v^{*}_{sc} = 400v) to establish 400V DC-link voltage.

 (S_n, D_n): form interfaced buck DC-DC converter for super-capacitor (v^{*}_{sc} = 410V).

By arranging the windings current on the inductance negative slope region and operating in hard free-wheeling, the SRM can be operated in regenerative braking. The components (L_b, S_a, D_b, C_{SC}) form a DC/DC buck converter to charge the super-capacitor. When the voltage of super-capacitor is over 78V, the battery will be charged via the diode(D_{co}).

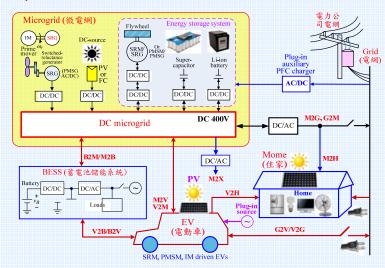
Wind Interior Permanent-Magnet Synchronous Generator



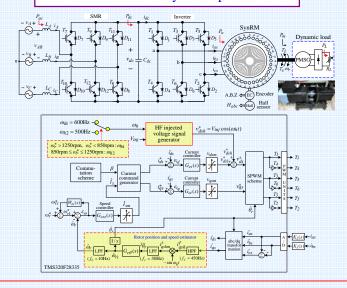
- Wind IPMSM: Interior PMSM, 6-pole, 3000rpm, 1kW
- SPMSM prime mover: SPMSM, 4-pole, 3000rpm, 2kW
- Power converter: The Vienna rectifier is established with three off-the-shelf modules (IXYS VUM 25-05E, 500V, 35A).

Experimental Home DC Micro-grid Incorporating with Battery Energy Storage System and Electric Vehicles

- Electric vehicles are incorporated as storage devices.
- Operations: V2G, G2V, V2H, V2M, M2V, B2G, G2B, B2M, M2B, B2V, V2B.



Position Sensorless SynRM Speed Drive



EV IPMSM Drive with Super-capacitor Energy Storage and Photovoltaic Auxiliary Energy Harvesting

