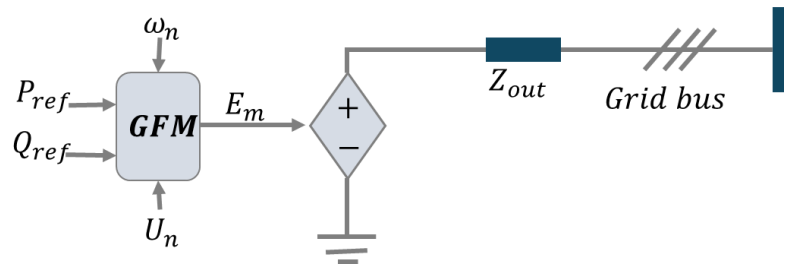
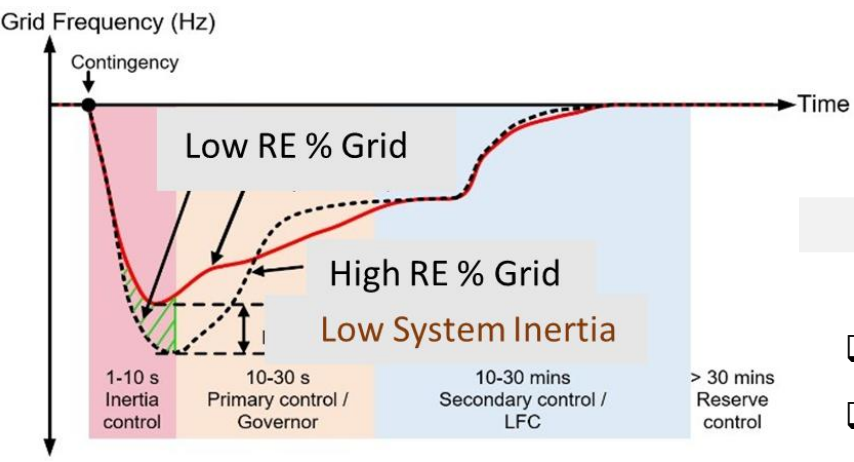


Research title: A Study on Fuzzy Control Using a GFM-VSG Inverter Model

Background: Energy transition and renewable energy (RE) integration

Challenge

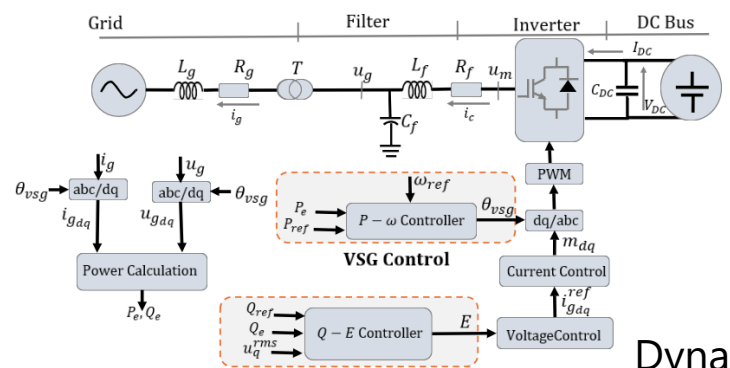
- Low system inertia
- Grid stability
- Islanding capability



- ❑ Grid Stability (Inertia Emulation)
- ❑ Islanding Capability

Grid Forming Inverters (GFM) are recently gaining more attention

Method GFM Inverter:

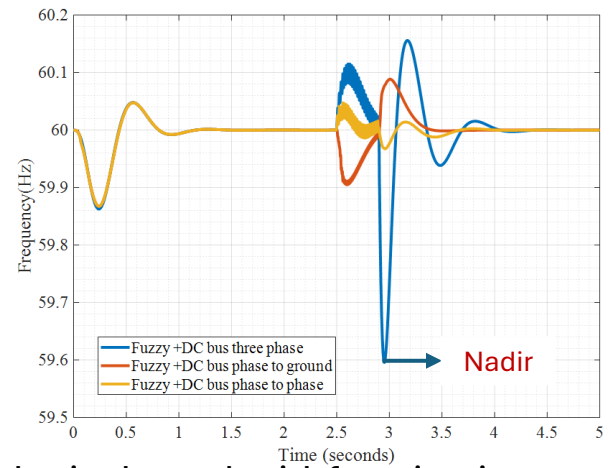


The Swing equation P - omega Controller

$$2H \cdot \frac{d\omega_{vsg}^*}{dt} = P_{ref}^* - P_{out}^* - D(\omega_{vsg}^* - \omega_{grid}^*)$$

Dynamically change the unit inertia constant **H** and damping **D**

Result:



Summary With more renewable energy on the grid, inertia drops, which can affect stability. Fuzzy logic-based grid-forming inverters provide fast, adaptive control to supply synthetic inertia, enhancing frequency stability.