SweGRIDS

The technical power-based challenges of power systems with major share of power production infeed via power electronic devices

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Project funded by:

Energimyndigheten VATTENFALL Hitachi Energy

Problem Motivation/Objectives

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- Rapid increase of converter based non-synchronous generation (NSG)
- Power system stability issues associated with high penetration of renewable generation
  - Decrease in system inertia, higher ROCOF
  - Lower short circuit current, decrease in system strength
  - Existing grid operator challenges
- To facilitate a transition towards majority share NSG
  - Need to understand changing system characteristics
- Perform a small signal stability analysis of a small and large test system considering the impact of:
  - Increasing penetration of NSG
  - Location of NSG/Distribution of NSG in system

Results

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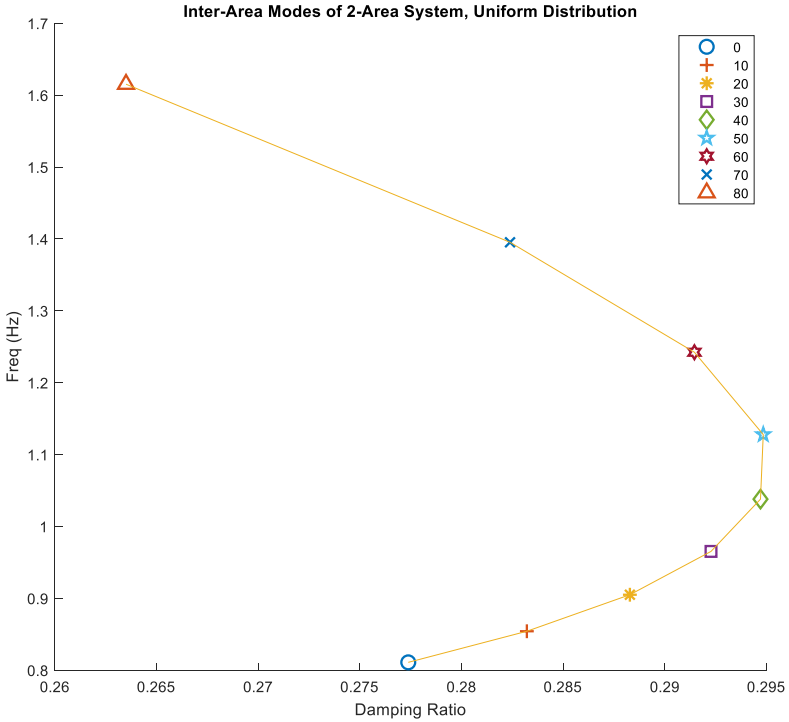

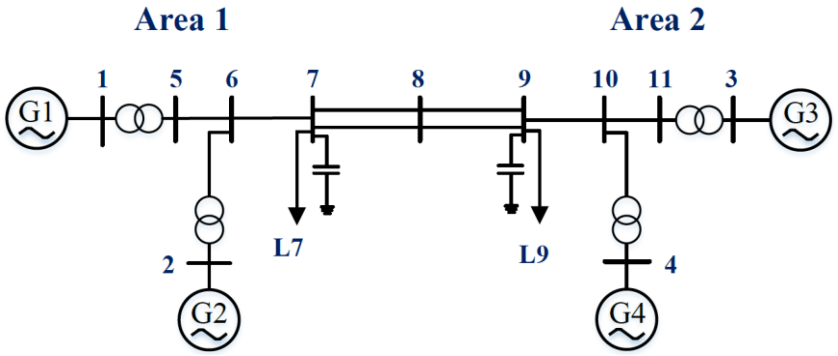

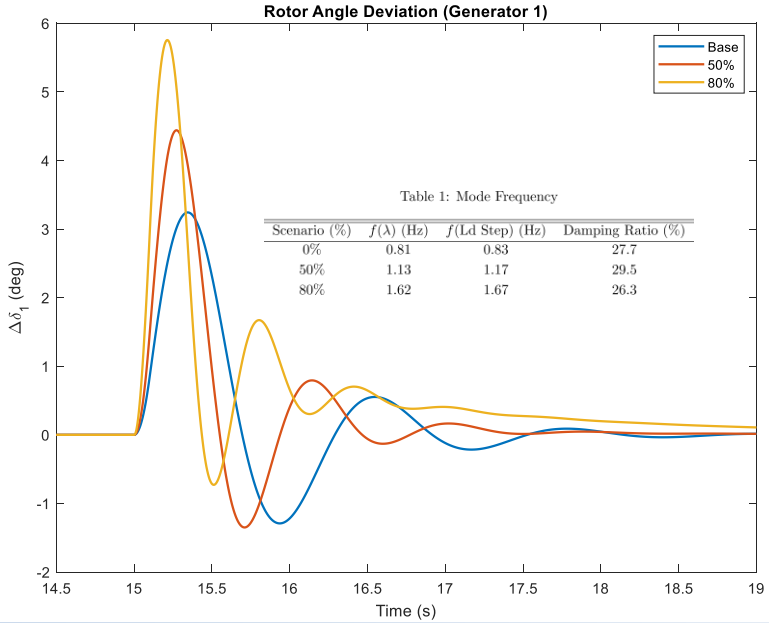

Table 1: Mode Frequency

Scenario (%)	$f(\lambda)$ (Hz)	f(Ld Step) (Hz)	Damping Ratio (%)
0%	0.81	0.83	27.7
50%	1.13	1.17	29.5
80%	1.62	1.67	26.3