

The conventional interconnected power system based on coal and hydro power generating plants are now causing a significant impact on the environment. Hence, the 21st century is witnessing the need to harness the renewable energy, such as wind, solar etc., and getting injected into the existing grid. This increasing generation of energy from the renewable sources, has significantly increased the operational challenges for the system operators. Earlier, the system operator has to worry mainly about the uncertainty of the load, but now they has also to deal with the uncertainty of the generation. Hence, the future grid requires more placement of sensor such as Phasor Measurement Units (PMU) to get time stamped data which helps towards on-line monitoring, estimation of dynamic or static models and real time control of the power system.

The main aim of this thesis is to develop a robust method for on-line identification of low frequency modes corresponding to a single generator or a group of generators oscillating in interconnected power system. Conventionally, the modal analysis has been widely used for assessing the low-frequency oscillations or the small signal stability of the systems. However, these approaches are off-line and are suitable for analysis and design of the system, but cannot be used for monitoring the stability of the system in real time. It is important to identify the critical modes or the modes corresponding to the poorly damped oscillations in real time, so that, the effective control action can be taken to mitigate their effects towards the stability of the interconnected power system.