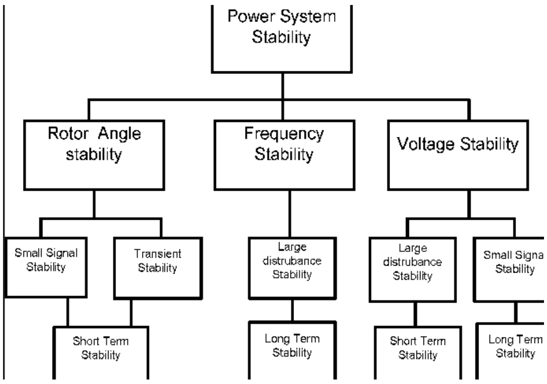
Transient Stability Analysis:

The definition of stability includes a number of factors that may be involved: the load carried before a fault occurs, the type of fault and its location in the system, the time required to clear the fault, the change in steady state operating angles when the faulted portion of the system is removed from service, and the moment of inertia of the rotating machines at each end of the system. Stability, then, is the ability of a system to continue to operate without loss of load when any reasonable system change or disturbance occurs. The transient stability is one of the important constraints in the planning and maintenance of a secured power system operation. Transient stability is concerned with the ability of the power system to maintain synchronism when subjected to severe perturbations. These perturbations can be faults such as: a short circuit on a transmission line, loss of a generator, loss of load, gain of load or loss of a portion of transmission network.



The initiation of fault and its removal by circuit breakers in a power system shows that the system is going through a fault with change in the system configuration in three stages: pre-fault, fault and post-fault stages. The dynamics of the power system during fault and post-fault periods are nonlinear and the exact solution is too complex. In transient stability studies, particularly, those involving short periods of analysis in the order of a second or less, a synchronous machine can be represented by a voltage source behind transient reactance that is constant in magnitude but changes its angular position

Effect of fault location :

This sub-section analyzes the effect of fault location in transient stability. A three-phase fault is simulated at two different locations, one close to the generating station and the other one far from the generating station.

Effect of damping factor on the system stability:

The damping factor prevents the growth of oscillations. Machines within the system that are properly damped regain synchronism when the fault is cleared. However, those that are poorly damped wereobserved to be unstable with their rotor angles continuously diverging. When the fault is cleared, the speed is continuously increasing and system is not able to retain stability due to the lack of proper damping.

Effect of fault clearing time

In order to know the effect of fault clearing time on transient stability, a disturbance in the form of a three phase fault was simulated at some buses and different lines removed to determine the stability or otherwise of the power system. The critical clearing time, which is a measure of the stability, was determined by varying the fault clearing times. The stability and instability of the power system at a given fault is determined by the behavior of the generators in the system. If the rotor angles of the generators diverge, the system is unstable and if otherwise, the system is stable