C39 MULTIMACHINE POWER SYSTEM STABILITY

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The paper presents an analysis of the stability of a system of inter-connected synchronous machines. A computer model has been developed to simulate synchronous machines and to analyse their stability by monitoring the load angle and terminal voltage variations with time under varied faults in the network.

A transfer function model is developed for a synchronous machine incorporating Automatic Voltage Regulator (AVR) and Automatic Load Frequency Control (ALFC) feedback loops. The loops are split into functional blocks which are represented by transfer functions in the Laplace transform domain. These are then transformed into the time domain to form a state space model, which is solved using a numerical technique to reveal the variation of generator parameters such as load angle, internal e.m.f. etc. with time.

In a multimachine power system, the above mentioned variations are calculated for each synchronous machine in the system; under varied faults. The initial system configuration prior to the fault is determined by performing a load flow study. Changes in system conditions under faults cause perturbations in the system which may eventually lead to instability. These changes are calculated by solving a set of network-performance equations iteratively. These changes are substituted in the generator state space models to reveal the new load angles, internal e.m.f.s etc. A series of such interactive solutions give the variation between the load angles and terminal voltages vs time for all the generators in the system.

References

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