Estimation of Frequency Control Performance

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In an Interconnected system, as the load demand varies, both area frequency and tie line power interchange also vary. According to the NERC control performance standards, the quality of frequency regulation is defined in terms of two indices; Control Performance Standard, CPS1 & CPS2. The index CPS1 evaluates the performance of a control area with respect to control of interconnection frequency and tie line power flows. In a previous research a fast method of calculating the CPS1 was proposed and applied to a simple two-area interconnected system.

The purpose of this research is to calculate the CPS1 for the Manitoba Hydro system using the probability distribution of load change without running a time domain simulation. The calculation of CPS1 requires certain set of data from a power system; the frequency deviation from the nominal frequency and tie line power changes from the scheduled power. These data have been generated by providing step load changes to a detailed PSCAD model of Manitoba Hydro system.

The obtained result has been validated with the time domain simulation result from the data obtained from PSCAD/EMTDC. As Manitoba Hydro is using PSSE for all their simulation purpose the same experiment is to be justified using PSSE. A simple 2 area 4 generator system is used to test the method. System Identification technique has been used to identify a good match of a transfer function in order to predict the response obtained from the PSSE simulation for step load changes to the system. Traditional time domain simulation takes a large computational time and effort. Comparing to that estimation of frequency control performance and hence calculating CPS1 using probability distribution of load change is reliable and takes shorter time period. In the end a program will be written to complete the process in an easy, user friendly and faster way.

REFERENCES


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