

Power system Operation Lab

Complex Engineering Problem

Problem Statement:

In an electric power system, **Load Frequency Control (LFC)** is a system to maintain reasonably uniform frequency, to divide the load between the generators and to control the tie-line interchange schedules. Load Frequency Control badly needed for power system because if the normal frequency is 50 Hertz and the system frequency falls below 47.5 Hertz or goes up above 52.5 Hertz then the blades of the turbine are likely to get damaged to prevent the stalling of the generator. Different controllers can be used to control and maintain the stability in the system. Each controller has their own capability to control the system.

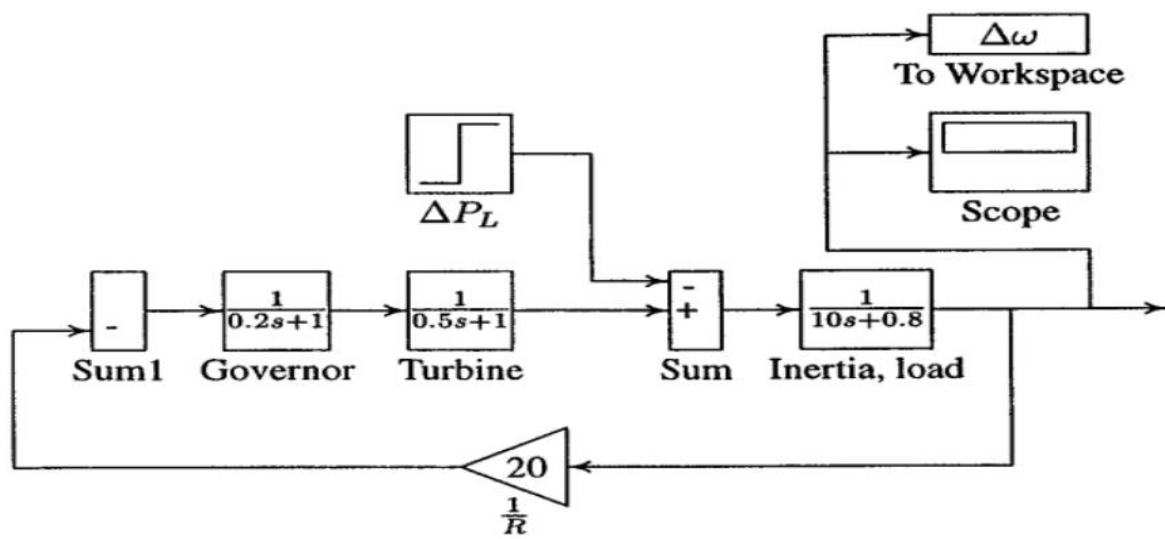
In load frequency control, the main model containing the Governor, Turbine and inertia load will be implemented MATLAB/SIMULINK according to model.

To control this feedback path is major concern, **PID controller** is mostly and conventionally used controller. Whereas, in Case 1 selection of proportional, integral, and derivative parameters to maintain the system within limits.

ANN controller can give sharp and better response, in second case to design the controller and analyze the response of system must done in this case.

An adaptive neuro-fuzzy inference system or **adaptive network-based fuzzy inference system (ANFIS)** is a kind of artificial neural network controller, in case 3 system must be controlled with ANFIS controller and response time should be checked as well.

In Case 4, comparisons of all types of generators response must be done and it should be represented by table and graph also.



WP1 Depth of knowledge (WK3 - Engineering Fundamentals, WK5 - Engineering Design, WK6-Engineering Practice, WK8 - Research Literature)

The Knowledge of different types of Controllers (PID, ANN, and ANFIS) working, basic principles, and designing of power system and its implementation in MATLAB/Simulink.

WP3 Depth of Analysis:

Based on analysis of power system and controller behavior, different operational characteristics of power system and parameters of controllers must be appropriating.

Assessment Rubrics of CEP

Performance	Meets Expectations	Average	Does not meet Expectations.	Marks
	(100-80%)	(80-40%)	(40-0%)	
Simulation techniques CLO2	Selects relevant tools in simulation to solve the problem, appropriate selection of controller for controlling of system.	Selects relevant tools in simulation to solve the problem, appropriate selection of controller with minor error.	Have no idea about appropriate tools for solving problem and no idea of controller settings.	[5]
Report of CEP CLO2	Submit the CEP Report (Including Literature Review, procedure, and observations/graphs) on due time	Submit the CEP report (Including Literature Review, procedure, and observations/graphs) manual less accurate and not having information.	Submit the CEP report (Including Literature Review, procedure, and observations/graphs) manual less accurate and after due date.	[5]
Presentation of CEP CLO3	Effective presentation is delivered, and adequate teamwork is shown by team members.	Average presentation is delivered, and moderate teamwork is shown by group members.	Below the average presentation is delivered and no cooperation is represented by team members.	[5]
Total				[15]