

## Thermal Power Plants: Modelling, Simulation, & Control - Today's Challenges

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Electricity touches almost all facets of human life today; it is a key indicator of economic development and standard of living of the people in any country. The current global scenario faced by electric utilities (or power plants) is characterized by many challenges like minimizing the cost of power generation, responding instantaneously to grid demands, demands for a high degree of availability and reliability, meeting stringent government regulations on environmental impact, conservation of natural resources etc., Market driven forces have resulted in the increased usage of Fossil Fuel Power Units (FFPU) in load-following duties.

Power generation is primarily dependent on coal fired power plants throughout the world. These plants contribute more than 50 percent of global power generation. This dependence of power generation on coal is likely to be continued in future for next two or three decades also, as coal is cheaper, easily available and distributed throughout the world.

The control system of a power plant plays a key role, in optimizing the unit operation from the point of view of efficiency, emission control, response to load demand etc. The challenges call for the development of comprehensive and flexible control methods.

A power system is intended to supply the electric power demanded by the consumers in a reliable form with good power quality characteristics. Total system load usually does not remain constant due to connection and disconnection of individual loads to power system. This leads to random and cyclic load demand patterns on the generating units which in turn causes unacceptable frequency fluctuations. Free Governing Mode of Operation (FGMO) is being proposed to mitigate the ill effect of undesirable frequency fluctuations.

This half a day short-course will provide adequate expertise to participants on the following aspects of FFPU: (i) the major components, (ii) the design concepts of control, (iii) the basics of plant modeling, (iv) carrying out simulations for different scenarios and using the result for optimization of controls and plant operation, (v) FGMO and its implementation at site.



**Bio Sketch of Dr. S. Dharmalingam:** Dharmalingam earned his B.E. (Hons) degree in Electrical and Electronics Engineering from the University of Madras, M.E. in Computer Science from Regional Engineering college (presently National Institute of Technology) Trichy, and PhD from National Institute of Technology Trichy. He joined the Boiler Designs Division of BHEL, Trichy during 1977. Subsequently he worked in the field of Boiler Instrumentation and Controls for more than three decades. Then he served as head of Research & Development, Welding Research Institute and Quality departments in BHEL, Trichy. His areas of interest are Power plant controls, Instrumentation for hazardous applications, and knowledge management. He has been felicitated as an "Eminent Engineer" for his contribution by The Institution of Engineers (India), Tiruchirappalli Local Centre during the year 2010. He is also a recipient of the BHEL Excel Award for the year 2012 for best paper publication.

He has authored and co-authored more than 12 scientific papers in the field of thermal power plant controls, control technology application to industrial processes, and Instrumentation for hazardous applications. He has more than ten patents to his credit. He is a Fellow of The Institution of Engineers (India), member of NFPA, USA and an honorary member of Automatic Control & Dynamic Optimization Society, India.



**Bio sketch of Dr. L. Sivakumar:** Dr.Sivakumar earned his B.E. degree in Electrical Engineering from Regional Engineering College (presently National Institute of Technology) Trichy (1970), M.Sc. (Engg.) in Applied Electronics & Servomechanisms from PSG College of Technology, Coimbatore (1972) and Ph.D. from Indian Institute of Technology, Kharagpur (1980). He joined Energy Systems and New Products Division of BHEL during 1975 and subsequently moved to Corporate Research & Development Division of BHEL, Hyderabad. After serving in various capacities, he superannuated as General Manager in Dec. 2007. His areas of interest are Mathematical modeling and Simulation, System Identification, Training simulators, Hardware-In-Loop Simulators, Development of Software modules for Performance Analysis Diagnostics and Optimization for thermal power plants. He has been felicitated as an “Eminent Electrical Engineer” for his outstanding contribution in the field of Power Sector by The Institution of Engineers (India) during the year 2007.

After superannuation from BHEL, he joined Sri Krishna College of Engineering and Technology, Coimbatore. He is responsible for Industry – Institute collaborative activities including consultancy services. He has been invited to ABB, Bangalore as Advisor for two years (part time basis) to provide domain knowledge to young engineers. His present research areas include big data analysis, soft computing techniques, Gasifier control, wind turbines and improvements on Z-source invertors. He has published around 50 research papers in International and National Journals. He has a few software copyrights and a patent to his credit. He is a member of IEEE, ASME, ISTE and also a life member of CSI.