

COMPARISON OF TWO MATHEMATICAL MODELS FOR CONTROL SYSTEM OF LEVEL IN CONDENSER OF TURBINE IN THE THERMAL POWER PLANT

Prodanović, S.¹, Nedić, N.², Filipović, V.²

¹ University of East Sarajevo, Faculty of Mechanical Engineering, East Sarajevo

² University of Kragujevac, Faculty of Mechanical Engineering, Kraljevo

E-mail: elsing123@yahoo.com

Abstract: This paper shows large importance of adequate mathematical modeling of system. Control system of level in condenser of turbine in thermal power plant Gacko is taken into exploration. Here it was presented in two ways, as first-order system and second-order system. Their analysis and comparison were carried out after auto-tuning of PID (proportional-integral-derivative) controller using relay feedback test simulation. Obtained parameters of PID controller were applied into both variations of the system block diagram and its responses have been utilized for giving evaluation of researched models.

Key words: mathematical model, relay feedback test, simulation

INTRODUCTION

All analytical and numerical investigations depend on its appropriate mathematical model. The task is as better as possible presentation of system behavior. In this paper two mathematical model of control system of level in condenser of turbine in thermal power plant Gacko were compared. In first case, condenser was presented as first-order system (using continuity equation) [1] and in second as second-order system (taking into account also transfer function of turbine) [2]. The main aim of this paper was proving better properties of second-order model in order to improve functioning of explored control system. Simulation of auto-tuning of PID controller using relay feedback test was performed in both cases [3]. In the following exposure these two approaches will be shown parallel.

DESCRIPTION OF THE SYSTEM

This system for control level in condenser is one of subsystems in thermal power plant. In order to give closer explanation of the problem, approaches of modeling are presented here.

System structure

Level in condenser depends on the amount of steam which comes from turbine (directly and from heater for regenerative heating), supply of demineralized (DEMI) water, drain condensate and working of vacuum pumps for obtaining vacuum in condenser. Control of level is performing by using two closed-loops, i.e. over valve for condensate drainage from the condenser and valve for demineralized (DEMI) water supply. Accordingly, good dynamic behavior of system and keeping desired level value in steady state is enabled using dumping control method. Schema of this control loops is shown in Fig. 1.

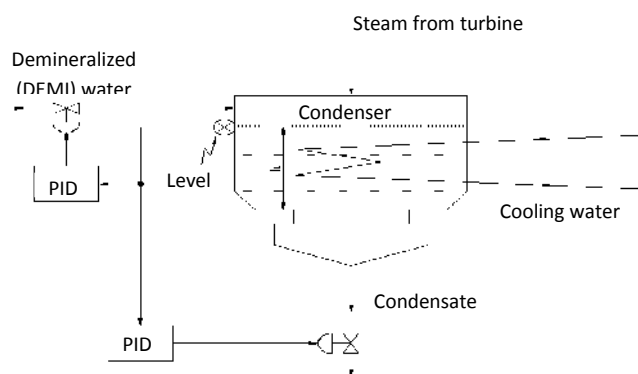


Figure 1. Control system of level in condenser in thermal power plant Gacko [3]

