

A control model of the operating head dynamics of Jebba hydropower system
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Abstract

Electricity availability in Nigeria has been very poor over the years, underscoring the need for a better approach for managing generating resources. This paper presents the development of a dynamical model of the operating head of Jebba hydroelectric power plants for system studies and control system design. The mathematical model of the plant was developed from flow continuity conditions, some model parameters were obtained from the source while others were estimated from observations and analysis of the measured data. The developed dynamical equation was validated by comparing the response produced with values obtained by measurement. Upon integrating the model equation in Microsoft EXCEL VBA® environment, a deviation of 2% from measured values was observed. Operators can therefore use the model as a decision support system, while control engineers can find the model directly applicable for optimal and robust control system design for the station.

Keywords: Control, Dynamical model, Hydropower, Inflow, Operating head.

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