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Neural Network based Hydro Electric Generation Modelling

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Hydropower generation may be a function of discharge of the generating units and therefore the difference between the fore bay and tailrace levels of the reservoir, and is subject to penstock head losses and to the generation unit efficiency factor, which successively may be a function of the reservoir level and reservoir capacity. For this particular plant data from Sewa Hydroelectric Project StageII which may be a run of the river project having installed capacity of 120 MW situated in Jammu region has been used. In this paper two hydro electric models like reservoir level versus capacity model and head loss versus water discharge rate are studied which are used for calculating net head and further are often used for online implementation of Availability Based Tariff during which day ahead scheduling is completed . so as to accomplish this task, data from plant is used for training, validating and testing the synthetic neural network (ANN) model which give accurate results. Thereafter with these models, a comparison is formed with multiple correlation models in terms of their prediction accuracy, mean square error and regression R value.

*In hydro electrical power plants, for calculating energy and online implementation of availability based tariff in Indian power industry , there's always a requirement to develop models for hydro electric plant as all is exclusive to its location and requirement. In most cases, the parameters to be estimated are of nonlinear model with reference to control and state variables.Here data used has been taken from Sewa Hydroelectric Project StageII,a run off the river project, which fulfills the partial requirements of the irrigation in state of Jammu and Kashmir. the facility home is located during a village called Mashka near the junction of Sewa and Ravi, The project will generate 533.52 million units during a 90% dependable year and also provide 120 MW peaking capacity within the power grid of northern region. This plant features a small reservoir with maximum storage capacity of 0.9174 million cubic meters (MCM) and average storage capacity of 0.2234 MCM. Moreover, elevation is taken from above mean sea level through some level sensors, maximum reservoir level of this plant is 1200 meter and average reservoir level measured is 1184 meter.The project envisages 53 meterhigh concrete gravity dam, a 10,020 meter long head race tunnel and its power house are going to be equipped with 3*40MW vertical Pelton turbine units with rated net head of 560m. Its geographical coordinates having latitude 32 ° 36' 38" N to 32° 41' 00" N and longitude 75° 48' 46" E to 75° 55' 38" E Hydroelectric scheduling of the plants requires a judicious modeling of every of the hydro electric plant for an improved efficiency, optimum use of water resources and to arrest possible losses. The scheduling of water releases, which is that the water discharge for a few period of your time , depends on reservoir capacities [Wood and Wollenberg, 1984]. Since hydro electric power generation depends on the discharge, an optimal discharge schedule is paramount for an optimal hydro electric generation scheduling. Scheduling and modeling of water releases is an integral part which plays a really important role in day to day operations of a power system.*