ANALYTICAL CONTRIBUTIONS TO THE DEFINITION OF THE PELTON TURBINE CONTROL CHARACTERISTICS

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ABSTRACT

The paper has investigated the volume control by injector (provided with needle valve and servomotor for acting) of the Pelton turbine that suitably modifies the performances of the hydro-energetic power plant, permitting a variable electric conversion. Beginning from the definition of the control coefficient $k_r \in [0, 1]$, we have demonstrated the dependence between characteristic magnitudes, by obtaining characteristic magnitudes: input flow rate, $Q(k_r)$, velocity of the jet $v_{jet}(k_r)$, tangential velocity of the rotor $u(k_r)$, angular speed $\omega(k_r)$, speed $n(k_r)$, and input hydraulic power $N_i(k_r)$; the moment of the machine $M(k_r^2)$; powers: hydraulic, of the water jet $N_{jet}(k_r^3)$, mechanic of the turbine $N(k_r^3)$ and electric of the power station output $N_b(k_r^3)$; efficiencies: of the supply $\eta_{aducit}(k_r^2)$ and global, hydroelectric $\eta(k_r^2)$; ratio of the speed variation, obtained by a gear in order to ensure a constant speed for generator action $i(k_r^{-1})$. The study is accompanied by a numeric application. Relations permit a right control of the turbine Pelton in variable condition for exploitation, with minimum of errors and energetic loss.

REFERENCES