NUMERICAL AND EXPERIMENTAL ANALYSIS OF THE TORQUE AND BRAKE FORCE OF A PELTON TURBINE USING THE k-ε AND SST TURBULENCE MODELS

Yessica Salazar Marval, Yordy González–Rondón, Johnny Martínez

ABSTRACT

This article presents the numerical and experimental simulation of the torque and brake force of a Pelton Armfield FM-32 turbine for different openings of the injector nozzle that regulates the inlet flow, with the purpose of studying the behavior of the turbine, based on output performance. The methodology consisted of building the geometry of the Pelton turbine with CAD software, physical models were developed with different percentages of injector nozzle openings (100, 85, 75, 50, 25 and 15%), the domains were discretized. of calculations applying the unstructured meshing technique and the simulations were carried out in a transient state applying the k-ε and SST turbulence models. The numerical results showed the numerical convergence curves, the experimental and numerical behavior of the torque and brake force of the Pelton turbine, and the percentage error of the numerical results. It was concluded that the turbulence model that best suits the estimation of the variables studied was the SST model, which represents greater reliability and accuracy in the results.

Keywords: Numerical Simulation, Pelton Turbine, Brake Force and Torque, K-E Turbulence Models, SST Turbulence Models.

DOI: 10.23881/idupbo.024.1-2i