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Flow Analysis for Different Pelton Turbine Bucket by Applying Computation Fluid Dynamic

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Abstract : In the process of constructing hydroelectric power plants, the Pelton turbine, which is characterized by its simple manufacturing and construction, is performed in high head and low water flow. Parameters of the turbine have to be comprised in the designing process for obtaining hydraulic turbine with the highest efficiency during different operating conditions. The present investigation applied three-dimensional computational fluid dynamics (CFD). In addition, the bucket of Pelton turbine models with different splitter angle and inlet velocity values were examined for determining the force and visualizing the flow pattern on the bucket. The study utilized two diverse bucket models at various inlet velocities (20, 25, 30,35and 40m/s) and four different splitter angles (55, 75,90and 115 degree) for finding out the impacts of every single parameter on the effective force on the bucket. The acquired outcomes revealed that there is a linear relationship between force and inlet velocity on the bucket. Furthermore, the results also uncovered that the relationship between splitter angle and force on the bucket is linear until 90 degree.

Keywords : bucket design, computational fluid dynamics (CFD), free surface flow, two-phase flow, volume of fluid (VOF)
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