عنوان مقاله:

Experimental Study and Three-Dimensional Numerical Flow Simulation in a Centrifugal Pump when Handling Viscous Fluids

محل انتشار:

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خلاصه مقاله:

In this paper the centrifugal pump performances are tested when handling water and viscous oils as Newtonian fluids. Also, this paper shows anumerical simulation of the three-dimensional fluid flow inside a centrifugal pump. For these numerical simulations the SIMPLEC algorithm is used for solvinggoverning equations of incompressible viscous/turbulent flows through the pump. The k-ε turbulence model is adopted to describe the turbulent flow process. These simulations have been made with a steady calculation using the multiple reference frames (MRF) technique to take into account the impeller- volute interaction. Numerical results are compared with the experimental characteristic curve for each viscous fluid. The data obtained allow the analysis of the main phenomena existent in this pump, such as: head, efficiency and power changes for different operating conditions. Also, the correction factors for oils are obtained from the experiment for part loading (PL), best efficiency point (BEP) and over loading (OL). These results are compared with proposed factors by American Hydraulic Institute (HIS) and Soviet Union (USSR). The .comparisons between the numerical and experimental results show good agreement

کلمات کلیدی:

Centrifugal pump, Performance, Newtonian fluids, Viscous fluid flow, Correction factors, 3D numerical simulation