

عنوان مقاله:

Numerical and Economic Study of Centrifugal Pump as Turbine Performance

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خلاصه مقاله:

In this paper, performance of centrifugal pump as turbine (PAT) is investigated numerically. Three different specific speeds are considered and three pumps are designed using diagrams from catalogues and CFTurbo V.9 software. Next, models are analyzed by Ansys CFX 16 software and results are compared with those of CFTurbo software. Also, a mesh study analysis for one case is performed in order to show the effect of grid size on the solution. In addition, three different flow rates of 75%, 100%, and 125% of best efficiency point (BEP) are considered for extracting head-flow rate diagrams and comparing results of CFX and CFTurbo software. In next step, using relations between pump and turbine modes (PAT formulations) and by changing boundary conditions in CFX, turbine mode is investigated and efficiency is compared with pump mode. Finally, by an economic analysis a comparison between PATs and turbines with same nominal output powers are performed to distinguish which case is more profitable. Results showed that PATs have lower payback time in comparison with turbines with equal output power (in low capacities), although they have lower efficiencies.

کلمات کلیدی:

Pump as turbine, numerical study, specific speed, economic analysis

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