

عنوان مقاله:

A Study on Booster Pump System with Flow Sensor for Individual Flow Control Method

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خلاصه مقاله:

Booster pump system (BPS) can control the number of revolutions through an inverter by combining two or more vertical or horizontal centrifugal pumps in a series. Efficiency and energy savings, the most appealing aspects of booster pump systems, can be improved by controlling the operating conditions of individual pumps by measuring the flow rate of each pump. For improved operation, a booster pump system with a flow sensor to detect individual pump flow rates and a control algorithm to manage each low and high flow rate pump's revolutions per minute are critical. To achieve this, first, the turbine-type flow sensor was developed through computational fluid dynamics and experimentation. The flow sensor was improved using computational fluid dynamics, and its accuracy was validated through experiments. The resulting flow measurement accuracy of the designed flow sensor was within ۴%, with a measurement uncertainty of ۰.۴%. In addition, an experimental pump facility was built and used to evaluate booster pump system performance to investigate the energy saving rate. Then, after driving one low-flow rate pump at a set pressure, the flow and frequency control operation algorithm was used. This algorithm increased the allowed output of the drive pump by increasing the inverter's frequency. When the frequency corresponding to the allowed output is achieved in the low-flow rate pump rather than the high flow rate pump, power savings increased due to the low-flow rate pump's extended drive range. The investigations on the developed system's energy consumption revealed that the energy savings were approximately ۶.۲% compared to the conventional system, depending on the system in question. The development of a booster pump system with a flow sensor was tested, and it was found to be effective

کلمات کلیدی:

Booster pump, Flow sensor, Computational fluid dynamics, Experiment, Energy consumption

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