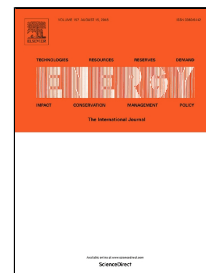


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Transient Flow Characterization in Energy Conversion of a Side Channel Pump under Different Blade Suction Angles

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Abstract: The flow in a side channel pump exhibits complex, three-dimensional and unsteady features. The present study investigates the transient flow interaction between the moving impeller region and the static side channel in a side channel pump which consists of 24 blades and a circular side channel. In this study, the transient flow features under different blade suction angle profiles have been investigated. The transient pressure distribution, velocity field, streamline plots, and mass flow exchange between the impeller and side channel are analyzed. Comparison shows that the side channel pump's flow mechanism is influenced by irregular flow characteristics and a number of vortex impulses at certain positions. Thus, zones of large vortices that cause low pump efficiency are demonstrated. The pressure fluctuation in the side channel pump is greatly influenced by the flow exchange between the impeller region and the side channel, and the pressure fluctuation frequency is related to the flow exchange frequency. This work helps understand the transient flow characteristics and serves as a guide for conducting further research in high-efficiency side channel pumps.

Keywords: Side channel pump, performance, transient flow characteristics, blade suction angle, mass flow, vortex

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