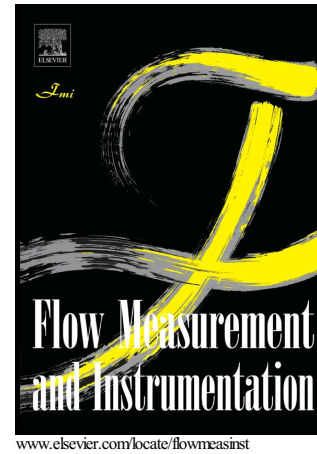


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Experimental Study on the Impulsion Port of a Trochoidal Wheeled Pump

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ABSTRACT

All positive displacement pumps produce a pulsating flow. The present paper reports the experimental measurement of steady flow pulsations in the outlet of the internal wheeled pump. In the measured flow, the manufacturing tolerance are responsible of part of the spectra of the whole pulsation. Time-Resolved Particle Image Velocimetry technique has been used for this purpose. The flow pulsation measurement from a direct visualization of the velocity profile was carried out. The flow rate signal is derived from ad-hoc integration algorithm of the radial velocity profile, where the area discretization is a constant parameter that is relevant to minimize PIV errors by velocity gradients regions near the wall. Spectrographic analysis on the experimental data revealed low frequency components related with manufacturing tolerances. Measurements of this non-invasive procedure are compared with detailed CFD numerical results obtained from an improved gerotor model where manufacturing tolerances have been included. To be compared, cross-power spectral density analysis has been applied. The results reported in the paper show a method to provide a fast non-invasive flow pulsation measurement not only for pumps but also could be extended to compare aging effects of other kind of fluid power devices.

KEYWORDS: TRPIV, gerotor pump, flow pulsation, cross-spectrum, power spectral density, spectrogram, manufacturing tolerances, trochoidal-gear, interteeth clearances

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