

TORQUE RIPPLE ATTENUATION FOR AN AXIAL PISTON SWASH PLATE TYPE
HYDROSTATIC PUMP: NOISE CONSIDERATIONS

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ABSTRACT

The main goal of this work is to reduce the disturbing noise generated by axial piston swash plate type hydrostatic pumps by attenuating the shaft torque variation. The analysis begins by deriving the equation of the shaft torque as a function of the average torque and the total number of pistons that are used within the rotating group. A swash plate control law is derived according to which if the swash plate is adjusted continuously, would give a constant shaft torque. In a second method, it is shown that with the use of an optimized index angle, the torque ripple amplitude for a tandem pump could be reduced by as much as 75%. The results from a Simulink® model of a nine piston pump with leakage and fluid compressibility effects support the analytical conclusions. It is also shown that there is a link between the torque ripple and flow ripple; hence the torque ripple attenuation results in the flow ripple attenuation too.