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Validation of Lateral Gap Leakage Objective Function for Use in Multi-Objective Optimization of Gerotor Pumps

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ABSTRACT

Gerotor pumps are a common pump choice used in the automotive, agricultural, and construction fields for their low cost and durability. Recently, demanding applications have called for significant design improvements in gear geometry. To address these design challenges, multi-objective optimization has been applied to gear geometry. The goal of this work is to introduce minimizing of lateral-gap leakage to the multi-objective optimization. An objective function for evaluating lateral-gap leakage based on 1D, pressure driven flow is proposed. This simplified approach is compared to CFD simulation solving of Reynolds equation with two pressure boundaries. Comparison of the simplified relation and the CFD simulation are used to validate the objective function for use in optimization.

KEYWORDS

Lateral-Gap Leakage, Reynolds Equation, Gerotor, Multi-objective Optimization