

Gear mesh geometry effect on performance improvement for external gear pumps

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Abstract

The parameters of the involute and cycloidal gearing which influence on fluid volume at the tooth space are analysed. It is established that to a greater extent on the flow rate of the pump with involute gearing is influenced by the radial clearance coefficient and the profile shift coefficient. The radii ratio of the auxiliary and pitch circles, as well as the radial clearance coefficient, mainly affect the flow rate of the pump with cycloidal gearing. Since the gear module is determined for reasons of pump flow rate, the teeth has a significant safety factor for contact stress and especially bending stress. This allows a wide variation of the gearing parameters in greater limits than in transmissions. The dependences of the fluid volume at the tooth space in the cycloidal gearing on the radial clearance coefficient, on the radii ratio of the auxiliary and pitch circles, on the fillet radius coefficient, is found. The boundaries of the variation of the gearing parameters were established taking into account the bending strength of the teeth. The analysis is carried out using the finite element method. Recommendations for the use of cycloidal gearing in external gear pumps have been developed.

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