正齒輪泵浦之壓力動態特性與應力分析

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摘要

An effective approach to the spur gear pump analysis was proposed. Using the FE method, the gear stresses of spur gear pumps were analyzed, including the dynamic pressure resulting from pump flow and leakage analyses. In addition, flow characteristics including the flow rate, displacement, leakage, and pressure were also analyzed. Above all, the dynamic pressure in the trapped zones during the interval of double tooth pairs in contact was demonstrated in detail. After that, the instantly resulting pressures and external torque were imposed on the analytical element model of whole gears via APDL programming. Accordingly, the fillet bending and Hertz contact stresses at several critical instants were calculated. The results exhibited that the maxima of the fillet and contact stresses did not simultaneously appear. Finally, the influences of relief grooves configurations, operation pressure drops, operation speeds on the dynamic pressure and gear stresses in the pump meshing zone are discussed.

關鍵字：Gear pump, Dynamic pressure, Flow rate, Mesh trapped zone, Gear stress