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Numerical and Experimental Study on Dynamic characteristics of gas spring resonant system

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The compressibility of the gas is used to produce elastic recovery force, provide the axial stiffness of the reciprocating movement of the piston, which effectively avoids the problems of stress concentration and large dynamic mass of the plate spring. The gas spring is a new development direction of the compressor and the free piston Stirling engine, it is important to clarify its dynamic characteristics while applying in the power machine. The gas spring resonance system is taken as the research object, a numerical model was established considering the dynamic processes such as gas flow at the gap seal. Driven by a linear motor, the dynamic characteristics such as piston displacement and working medium pressure change in the cavity were obtained. The numerical results were in good agreement with the experimental results, which verified the accuracy of the numerical model. The equivalent stiffness and damping of the gas spring system are measured indirectly by using the resonance principle of the system. It provides reference for the design of gas spring generator.

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