

油气弹簧力学特性仿真 Analysis of Energy Indication Characteristic of Hydro-pneumatic Spring Based on Damping Valve Parameter

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关键词: 油气弹簧 阻尼阀 阻尼力 弹性力 速度特性

摘要: 提出了针对油气弹簧力学特性研究的一种力学模型, 根据分段线性速度特性的计算方法, 运用薄板力学和流体力学基础理论, 分别对开阀点和最大开阀点处的缝隙宽度、阀片预变形量以及限位挡圈等阻尼阀结构参数进行了设计, 并通过修正的理想气体状态方程对油气弹簧弹性力进行了推导。通过台架性能试验与建模的仿真数据比较, 验证了设计方法的正确性, 最后编程分析了不同缸体和特性参数对油气弹簧速度特性的影响规律, 为研究减振装置的内特性提供了参考依据。 A research method of modeling hydro-pneumatic spring mechanical characteristic was presented. According to the calculation method of the sectional linear speed characteristic, the structural parameters of damping valve at the valve open point and the maximal valve open point, such as aperture width, predeformation of slice and positive retainer ring, were designed respectively by using sheet mechanics theory and fluid mechanics theory. The elastic force of hydro-pneumatic spring was deduced by the modified perfect gas equation. The correctness of the design method was validated through the comparison between performance test and simulation data. Eventually, the influence rules of different cylinder bodies and physical parameters on the speed characteristic of hydro-pneumatic spring were programmed and analyzed so as to provide reference for the research on the internal characteristic of damping equipment.

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