

基于ADAMS/Simulink/AMESim的油气悬架道路友好性分析 Road-friendliness of Interconnected Hydro-pneumatic Suspension Based on  
ADAMS/Simulink/AMESim

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关键词: 油气悬架 道路友好性 联合仿真

摘要: 为了合理选择大型工程车辆油气悬架参数以减轻车辆对路面的损伤程度, 基于连通式油气悬架单桥四自由度车辆振动模型, 考虑系统中蓄能器、液阻、单向阀及管路非线性特性, 建立了ADAMS单桥多体动力学模型、AMESim液压系统模型及Matlab路面谱模型, 选用“95百分位四次幂和力”作为道路友好性评价指标, 进行联合仿真。仿真分析得出了连通式油气悬架各参数对道路友好性的影响规律: 在一定范围内, 随着蓄能器初始充气压力和悬架缸阻尼孔径的增大, 道路破坏系数先减小后增大, 随着蓄能器总容积和管路内径的增大, 道路破坏系数减小, 管路长度对道路破坏系数影响较小。 The vehicle-generated road damage can be effectively reduced when the relevant parameters of hydro-pneumatic suspension in engineering vehicles are tuned reasonably. Multi-body dynamics model with ADAMS, hydraulic system model with AMESim and spectra of road surface roughness model with Simulink were established based on 4-DOF signal-axis vehicle model with consideration of the nonlinear characteristic of accumulator, fluid resistance, check valve and pipeline in the system. “95 percentage fourth power aggregate force” was used as the criterion for road-friendliness and co-simulation was achieved. The relation between road-friendliness and relevant parameters of interconnected hydro-pneumatic suspension was analyzed through co-simulation. In certain extent, the road damage coefficient first decreased and then increased with the increase of the initial pressure of accumulator and the diameter of damper hole in suspension cylinder. The road damage coefficient decreased with the increase of the total volume of accumulator and the inner diameter of pipe. The length of pipe had little influence on the road damage coefficient.

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