八轮扭杆摇臂式月球车越障性能分析

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摘要   针对八轮扭杆摇臂式月球车的结构特点及已知的月面地形条件，利用准静力学方法推导出了八轮扭杆摇臂式月球车结构尺寸与表征其越障性能的参量间的参数关系式。根据附着系数的物理意义，分析并确定了由月球车主要结构参数表述的单位直径车轮越过垂直障碍高度的参数式。利用该参数式绘制单位直径车轮越障高度与各结构参数间的关系曲线，对各轮的越障能力进行了综合评价，得出了该车型越障能力由两前轮决定的结论。最后，针对不同附着系数，绘制两个结构参数同时改变时越障高度的变化曲线，分析了两个主要结构参数对月球车越障能力的影响。在ADAMS中进行仿真验证，其结果与理论越障高度的相对误差在10%以内，证明了理论推导的可靠性。

关键词   八轮月球车   扭杆摇臂悬架   越障通过性

分类号   TH135

Analysis of the climbing obstacle capability of the eight-wheeled lunar rover with the torsion-bar and rocker suspension

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Abstract

Considering the structural characteristic of the eight-wheeled lunar rover with the torsion-bar and rocker suspension and lunar terrain condition, the relationship between the structural dimension of the eight-wheel lunar rover with the torsion-bar and rocker suspension and the parameters for figuring the climbing obstacle capability is described by the quasi-static method. According to the meaning of the inserted coefficient, the climbing vertical obstacle height of the unit wheel diameter is gained by the primary structural parameters described. The curve between climbing vertical obstacle height of the unit wheel diameter and every structural parameter is obtained. The climbing obstacle capability of every wheel synthetically is evaluated. Finally the variation curve is obtained when the structural parameters changes at the same time as the different inserted coefficient. The effect of the two primary structural parameters working on the lunar rover climbing obstacle capability is analysed. The relative error between the height of simulation and that of theoretical calculation is below 10%, which verifies the reliability of analysis.

Key words   eight-wheel lunar rover   torsion-bar and rocker suspension   climbing obstacle capability

DOI:

通讯作者