

基于多体接触碰撞的松软地面车轮沉陷仿真 Numerical Simulation of Wheel Sinkage on Soft Terrain Based on Multibody Contact Problem

左艳蕊 宗志坚 刘忠途 程源 樊世超

中山大学

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摘要: 提出了一种大规模多体系统接触碰撞理论与车辆地面力学理论相结合的仿真方法,并基于多体动力学仿真平台开发了车轮土壤相互作用仿真模块。基于该方法建立的土壤动力学模型和车轮土壤接触碰撞模型,进行了车轮沉陷的仿真。根据记录,在普通配置台式计算机上模拟土槽系统30 s的运动,仅需20 min。在相同实验条件下,仿真结果与土槽实验结果趋势一致,仿真曲线与土槽实验曲线吻合良好。由此表明该仿真算法能够满足越野行驶仿真的需要。 A new approach to realize the wheel-soil interaction simulation was proposed which applied the large-scale multibody contact problem and vehicle terramechanics theory. Using this method, we developed a wheel-soil simulation module in self-developed multibody dynamics simulation platform. Based on modeling of soil and wheel-soil contact, the computational implementation for wheel sinkage was depicted in detail. According to records, it needs only 20 min to simulate the motion of wheel-soil testbed system about 30s on a microcomputer with general configuration. Under similar conditions simulation and experimental results have good consistency. This indicates that the simulation algorithm could meet the requirement of off-road driving simulation.

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