

基于多体模型的重型车辆对路面动载特性 Dynamic Load Characteristics of Heavy Vehicle Based on Multi-body Dynamic Model

刘大维 刘伟 陈焕明 李国政 蒋荣超

青岛大学

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摘要: 利用SIMPACK软件分别建立重型车辆前悬架、后平衡悬架、转向系统和轮胎模型等,在此基础上建立重型载货汽车整车多体动力学模型,并采用谐波叠加法构建随机路面,建立了一个可考虑路面不平度的重型车辆对路面动载特性研究平台,利用该平台探讨了重型车辆轮胎三向动载荷与路面不平度、行驶速度的关系。仿真结果表明:前轴轮胎纵向动载荷小于中、后轴轮胎纵向动载荷,前轴轮胎侧向和法向动载荷大于中、后轴轮胎侧向和法向动载荷,中、后两轴轮胎动载荷相差很小;路面在A~D级、行驶速度为60~90km/h时,前轴车轮法向动载系数大于中、后轴车轮法向动载系数,前轴轮胎法向作用力小于中、后轴轮胎法向作用力。 A detailed multi-body dynamic model of a heavy truck was established by using SIMPACK software, which included front suspension, rear balance suspension, steering system, tyre system etc. The harmony superposition method was used to simulate stochastic road with a specific spectrum, and an integrated environment with different road roughness was built to study the relationship between vehicle dynamic tyre loads with three directions and different road grading and vehicle speed. Simulation results indicated that, the front axle's vehicle longitudinal dynamic tyre load was less than the middle and the rear axles, and the front axle's vehicle side and normal dynamic tyre load was more than the middle and the rear axles. For the middle axle and the rear axle, the vehicle dynamic tyre load was roughly the same. At 60~90km/h driving, on grade A~D road, the front axle's vehicle normal dynamic tyre load coefficient was more than the middle and the rear axles, and the front axle's vehicle normal tyre force was less than the middle and the rear axles.

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