

汽车乘员人体建模与动力特性仿真

摘要

随着我国经济的飞速发展，国民生活水平的大幅度提高，汽车在家家户户的生活中将扮演越来越重要的角色，与此同时，汽车乘坐的舒适度也成为了人们购买汽车所考虑的重要指标。可目前许多厂商对于汽车动力性、经济性、安全性的重视程度远远超过汽车的平顺性即汽车乘坐的舒适性，这需要我们提出更多可靠的设计优化方案改善这一现状。汽车行驶时，有路面不平以及发动机、传动系和车轮等旋转部件激发汽车的振动，产生的振动和冲击环境最终将对乘员舒适性产生影响，且主要根据乘员的主观感觉来评价，但客观评价指标也是必不可少的。客观评价方法主要是建立“路面—汽车—人”的闭环系统，路面不平度和车速形成了对汽车振动系统的输入，此输入经由轮胎、悬架、座垫等弹性阻尼元件和悬挂、非悬挂质量构成的振动系统的传递输出至人体。我认为核心部分便是振动频率传递至人体，人体各部位对于振动作出反应，这也便是我的研究方向。

我将对比并使用MATLAB建造合适的坐姿人体模型，以人体臀部为输入点，输入垂直方向的振动加速度、振动频率，得到输出结果。此结果可作为调节座椅参数与汽车悬架主要参数的有力依据，可以在汽车开发设计过程中，提高乘员乘坐舒适性，对减少汽车开发成本，缩短开发周期具有指导意义。

关键词：坐姿人体模型；乘坐舒适性；振动频率；MATLAB

Human Modeling of Car Passenger and Simulation of Dynamic Characteristics

Abstract

With the rapid development of our country's economy and the great improvement of the national living standard, cars will play a more and more important role in the life of every household. At the same time, the comfortableness of the car ride has also become an important index for people to buy cars. At present, many manufacturers pay more attention to vehicle power, economy and safety than the riding comfortableness, which requires us to propose more reliable design optimization scheme to improve this situation. When the vehicle is running, the vibration and impact environment are most affected by the uneven road surface and the vibration of the vehicle caused by rotating parts such as engine, transmission system and wheel will eventually have an impact on the comfort of the passenger, and mainly according to the subjective feelings of the passenger to evaluate, but objective evaluation indicators are also essential. Objective evaluation method is mainly to establish "road-car-human" closed-loop system, road unevenness and speed formed the input to the vehicle vibration system, this input through the tire, suspension, cushion and other elastic damping elements and suspension, non-suspension mass of vibration system output to the human body, I think the core part is the vibration frequency transfer to the human body, the human body parts to respond to vibration, this is my research direction.

I will contrast and use the MATLAB to build a suitable sitting human model, with the human buttocks as the input point, input the vertical direction of vibration acceleration, vibration frequency, get the output results. This result can be used as a powerful basis to adjust the seat parameters and the main parameters of automobile suspension. It can improve the riding comfortableness of passengers in the process of automobile development and design, and it has guiding significance to reduce the cost of automobile development and shorten the development period.

**Key Words: Human model of sitting position; Riding comfortableness;
Vibration frequency;MATLAB;**

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