

基于 ADAMS 的汽车悬架系统设计与动力学分析

## 摘要

由于科学技术的不断更新迭代,消费者对车辆性能的要求逐步提高,不断提升汽车悬架系统的性能随之晋为众多知名汽车企业在提升市场竞争力的重要手段。以往的动力学分析模式已经落后于车辆技术更新的节奏,计算机仿真软件逐渐步入人们的视野。如今,汽车悬架系统的动力学分析对悬架的开发以及生产有着非凡意义。我们可以使用 ADAMS/CAR 让悬挂系统的动力学分析更加便捷准确。

本篇以悬架系统为对象,动力学分析为主要手段。进入 ADMAS 的汽车模块中输入各项参数,建造起 McPherson 悬架模型,随后输入仿真参数从而开启悬架的动力学分析,再进入后处理系统可得到各项车轮参数的曲线图,通过对比设计标准发现这些参数存在一定不足。随后,通过多次修改硬点坐标找出对各个车轮定位参数影响较大的悬架结构设计硬点并对其进行优化使其达到理想范围。最后比较优化前后的仿真分析结果,对优化目标进行验证。

本篇通过以 ADAMS/CAR 中得到的 McPherson 悬架系统为研究对象,实现了基于仿真软件的悬架系统的动力学分析。存在不足的车轮参数在得到改进后,其动力学特性有了显著提升,从而使整车操纵稳定性得到加强,这研究方法可以为各汽车企业商品的生产提供一个较为新颖的思路。

**关键词:** 悬架系统, ADAMS, 动力学分析, 优化

## Abstract

Due to the continuous updating and iteration of science and technology, consumers have gradually increased their requirements for vehicle performance, and continuously improving the performance of automobile suspension systems has subsequently become an important means for many well-known automobile companies to enhance market competitiveness. The previous dynamic analysis model has fallen behind the rhythm of vehicle technology update, and computer simulation software has gradually entered people's vision. Nowadays, the dynamic analysis of automotive suspension systems has extraordinary significance for the development and production of suspensions. We can use ADAMS / CAR to make the dynamic analysis of the suspension system more convenient and accurate.

This article takes the suspension system as the object and dynamic analysis as the main method. Enter the various parameters in the car module of ADMAS, build the McPherson suspension model, then enter the simulation parameters to start the dynamic analysis of the suspension, and then enter the post-processing system to get the curve diagram of each wheel parameter, by comparing the design standards It is found that these parameters are insufficient. Then, by modifying the coordinates of the hard point multiple times to find the hard point of the suspension structure design that has a great influence on each wheel positioning parameter and optimize it to achieve the ideal range. Finally, the simulation analysis results before and after optimization are compared to verify the optimization goals.

In this article, the McPherson suspension system obtained in ADAMS/CAR is taken as the research object, and the dynamic analysis of the suspension system based on simulation software is realized. After insufficient wheel parameters have been improved, the dynamic characteristics have been significantly improved, so handling stability of the whole vehicle has been

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