基于多片离合器式 lsd 的主动限滑差速器设计与分析

摘 要

限滑差速器的出现，使普通差速器差速不差扭的缺陷得到了解决，因其可以使车轮按需分配扭矩，可以增强车辆行驶稳定性，复杂恶劣路面条件下的脱困能力以及汽车的主动安全性能。通过对片离合器式限滑差速器原理以及性能的分析，确定新型限滑差速器的研究基础和研究方向。

根据多片离合器式限滑差速器的限滑原理设计出了改进的限滑结构，通过改变摩擦片间的压力，使其拥有不同的限滑能力，弥补了普通多片离合器式限滑差速器无法主动控制的缺陷。针对现款哈弗 H9 的动力参数进行系统的设计，运用 SolidWorks 三维软件建立三维模型，通过 ADAMS 运动仿真软件进行运动学的仿真。对仿真结果所产生的数据进行分析论证优化新型限滑差速器的设计，最终通过仿真实验该新型限滑差速器能够有效的实现差速与限滑两大功能，无论是从转速的分配还是扭矩的输出来看结果都符合理论推导。

关键词：限滑，差速器，运动仿真

Design and analysis of active Limited-slip differential based on multi-clutch LSD

Abstract

With the advent of the Limited-slip differential, the problem of differential differential differential differential Torque is solved, because it enables the wheels to distribute torque as needed, thus improving the stability of the vehicle, the ability of extricating from difficult road surface and the active safety performance of vehicle. By analyzing the advantages and disadvantages of the existing Limited-slip differential, the significance of the Limited-slip differential in improving the performance of the automobile is expounded.

On the basis of multi-disc Clutch type Limited-slip differential, an improved slip-limiting structure is designed, in which a hydraulic mechanism is used to change the pressure between the friction plates so that they have different slip-limiting capabilities, it makes up for the lack of active control of a conventional multi-disc Clutch Limited-slip differential. According to the dynamic parameters of Haval H9, the system is designed, the three-dimensional model is established by SolidWorks, and the kinematics simulation is carried out by Adams. The data generated from the simulation results are analyzed and the design of the new Limited-slip differential is optimized. Finally, the new Limited-slip differential can effectively realize the functions of differential speed and limited slip, both the speed distribution and the torque output are consistent with the theoretical results.

Key words: Limited slip, differential, motion simulation.

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