

# Technische Universität Chemnitz

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## **Abstract:**

Actual passenger cars are equipped with a lot of driver assistant systems to increase safety, traction, efficiency, agility and comfort. These aims can be achieved by a controlled transmission of the engine torque to each driven wheel (active torque distribution, Torque Vectoring). Therefore special gear systems are necessary.

In this document firstly the basics on gear systems (planetary gears) and vehicle dynamics are explained. Furthermore the state of the art is shown based on a classification of active differentials and the advantages and disadvantages are evinced.

The next chapter describes a method for determining the mechanic load of the active differential for any car and road track. This is used for an evaluation of every differential gear system in view of efficiency, mechanic effort and control properties. The result reveals significant differences between the gear structures. Subsequent a method for a computer synthesis of new gear systems is developed and applied to the demands of a front driven vehicle application. The last chapter points out the positive effects of an active torque distribution on the driving dynamics.

As a result of this work three new gear structures are shown which are much better than all existing gear systems in terms of the evaluation properties.

## **Keywords:**

active torque distribution, Torque Vectoring, differential, vehicle dynamics, planetary gear, traction, agility, CO2 consumption