Abstract

Conventional chassis control systems based on brake interventions (e.g. ESP, DSC) essentially apply measured signals about vehicle dynamics such as yaw rate, longitudinal and lateral acceleration within its main control algorithm, primarily controlling the yaw rate. The body slip angle as an additional crucial parameter of vehicle motion is classified to be a significant indicator of driving instability and the evaluation of critical driving situations. However, due to complex and cost-intensive measurement technology respectively the deficiency to appropriately estimate the actual driving condition, state-of-the-art drive control systems do not consider this state variable within the scope of its control laws.
As a consequence thereof this can lead to insufficient or partially missing control intervention during specific critical driving situations, resulting in an incomplete stabilization of the vehicle.

This thesis presents the systematic development of possibilities for improvement regarding an explicit body slip angle control based on brake interventions. The applied development methods base on a detailed analysis of the characteristics and weak points of current control systems as well as the identification of relevant driving situations. By means of the selection of an appropriate, precise measuring method it is possible to use the body slip angle as a directly controlled variable within a specifically synthesized, model-based multi-state vehicle controller. Thereby the thesis includes a new approach of online design process. The key issue of the work comprises the objectively and subjectively evaluated proof of capability of the body slip angle controller performed in practical driving tests and in direct comparison to a conventional yaw rate control algorithm.