Vehicle dynamics and stability have been of considerable interest for a number of years. The obvious dilemma is that people naturally desire to drive faster and faster yet expect their vehicles to be “infinitely” stable and safe during all normal and emergency maneuvers. For the most part, people pay little attention to the limited handling potential of their vehicles until some unusual behavior is observed that often results in accidents and even fatalities.

This book presents several model-based estimation methods which involve information from current potential-integrable sensors. Improving vehicle control and stabilization is possible when vehicle dynamic variables are known. The fundamental problem is that some essential variables related to tire/road friction are difficult to measure because of technical and economical reasons. Therefore, these data must be estimated.

It is against this background, that this book’s objective is to develop estimators in order to estimate the vehicle’s load transfer, the sideslip angle, and the vertical and lateral tire/road forces using a roll model. The proposed estimation processes are based on the state observer (Kalman filtering) theory and the dynamic response of a vehicle instrumented with standard sensors. These estimators are able to work in real time in normal and critical driving situations. Performances are tested using an experimental car in real driving situations. This is exactly the focus of this book, providing students, technicians and engineers from the automobile field with a theoretical basis and some practical algorithms useful for estimating vehicle dynamics in real-time during vehicle motion.
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