

Yaw Stability Control Design Through a Mixed-Sensitivity Approach

Vito Cerone*, Mario Milanese*, and Diego Regruto*

*Dipartimento di Automatica e Informatica, Politecnico di Torino

Abstract - In this paper, a vehicle dynamic control (VDC) system for tracking the desired vehicle behavior is developed. A 2-DOF control structure is proposed to prevent vehicle skidding during critical maneuvers through the application of differential braking between the right and left wheels in order to control yaw motion. The feedforward filter is a reference generator which computes the desired yaw rate on the basis of the steering angle, while the feedback controller is designed to track the reference as close as possible and to satisfy suitable loop robustness requirements. Mixed-sensitivity minimization techniques are exploited in order to design the loop controller. The performance of the control system is evaluated through the hardware-in-the-loop simulation system under both emergency maneuvers and noncritical driving conditions, i.e., when the VDC system is not supposed to intervene.