Robust Vehicle Stability Control via Set-Based Methods

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The design of a robust lateral stability controller to track yaw rate and lateral velocity reference signals while avoiding front and rear tire force saturation is presented. The controller takes into account the driver's intent at the design stage by treating it as a measured disturbance. The uncertainty in the driver's input is modeled as a set–valued function of the vehicle states. The control design is based on a hybrid piecewise affine bicycle model with input–dependent and state–dependent uncertainties. The performance of the controller and the importance of driver behavior modeling are demonstrated through experimental tests on ice with aggressive driver maneuvers.

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