

State Estimation Method Based on Unscented Kalman Filter for Vehicle Nonlinear Dynamics

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Abstract : This paper provides a state estimation method for automatic control systems of nonlinear vehicle dynamics. A nonlinear tire model is employed to represent the realistic behavior of a vehicle. In general, all the state variables of control systems are not precisely known, because those variables are observed through output sensors and limited parts of them might be only measurable. Hence, automatic control systems must incorporate some type of state estimation. It is needed to establish a state estimation method for nonlinear vehicle dynamics with restricted measurable state variables. For this purpose, unscented Kalman filter method is applied in this study for estimating the state variables of nonlinear vehicle dynamics. The objective of this paper is to propose a state estimation method using unscented Kalman filter for nonlinear vehicle dynamics. The effectiveness of the proposed method is verified by numerical simulations.

Keywords : state estimation, control systems, observer systems, nonlinear systems

Conference Title : ICACET 2020 : International Conference on Automatic Control Engineering and Technology

Conference Location : Bangkok, Thailand

Conference Dates : February 03-04, 2020