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# Model Predictive Control with Unscented Kalman Filter for Nonlinear Implicit Systems

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**Abstract :** A class of implicit systems is known as a more generalized class of systems than a class of explicit systems. To establish a control method for such a generalized class of systems, we adopt model predictive control method which is a kind of optimal feedback control with a performance index that has a moving initial time and terminal time. However, model predictive control method is inapplicable to systems whose all state variables are not exactly known. In other words, model predictive control method is inapplicable to systems with limited measurable states. In fact, it is usual that the state variables of systems are measured through outputs, hence, only limited parts of them can be used directly. It is also usual that output signals are disturbed by process and sensor noises. Hence, it is important to establish a state estimation method for nonlinear implicit systems with taking the process noise and sensor noise into consideration. To this purpose, we apply the model predictive control method and unscented Kalman filter for solving the optimization and estimation problems of nonlinear implicit systems, respectively. The objective of this study is to establish a model predictive control with unscented Kalman filter for nonlinear implicit systems.

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