

Building Nonlinear Filter Simulation Platform With Scilab

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Abstract:

Nowadays nonlinear theories and nonlinear filtering technology is becoming more and more popular,especially in the fields of navigation guiding and control,image processing,malfunction detecting,objective tracking and so on.The most common used arithmetic for nonlinear filtering are EKF (Extended Kalman Filter) and UKF (Unscented Kalman Filter) which are both under limitation of gauss conditions .While in recently,PF (Particle Filter) turns up with none limitations .In other words it can be adapted to any kinds of nonlinear situation. In this paper, we will build a kind of nonlinear filter simulation platform on the base of computational software SCILAB and the TCL/TK language, including EKF,UKF and basical PF arithmetic.What is more,we will also introduce some new innovations in the basical PF arithmetic.In this simulation platform you should input your system state-space model and other basical information,then it will give you the estimation of true state value for your study or other usages.

This paper are divided into the following parts.In section one,we will introduce you some basical information about its history development and widely usage of nonlinear filter in briefly.In section two,we will explain the basical arithmetic of EKF,UKF and PF which are commonly used nowadays in details.For each method,we will give you the details about its arithmetic,limitation and partly program codes accomplished by the computational software SCILAB.What is more,we will introduce you some new innovations made for the basical PF arithmetic which have better performance in comparision with the former one.In the following part,section three,by use of the language TCL/TK we will make a friendly GUI which is used to accept your information and inputs.In the last section,section four which is the most important part of this paper,we will tell you how to use this nonlinear filter simulation platform and

some demos are also given to tell you how to make use of the platform in some fields such as navigation, tracking and so on.

Keywords:

Nonlinear Filter, SCILAB, TCL/TK, Simulation Platform