April 20, 2016

Title: Funnel Observation and Funnel Control

Abstract

We introduce the funnel observer as a novel and simple adaptive observer of "high-gain type". We show that this observer is feasible for a large class of nonlinear systems described by functional differential equations which have a known strict relative degree, the internal dynamics map bounded signals to bounded signals, and the operators involved are sufficiently smooth. Apart from that the funnel observer does not need specific knowledge of the system parameters, and we show that it guarantees prescribed transient behavior of the observation error. We compare the funnel observer to existing (adaptive) high-gain observers and illustrate it by a simulation of a bioreactor model.

In the second part of the talk, we show how the funnel observer can be used to design a funnel control law for relative degree two systems such that the derivative of the output is not needed.