

Observer-Based Control Design for Double Integrators Systems with Long Sampling Periods and Actuator Uncertainty

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Abstract : The design of control-law for engineering systems has been investigated for many decades. While many results are concerned with continuous systems with continuous output, nowadays, many controlled systems have to transmit their output measurements through network, hence making it discrete-time. But it is well known that the sampling of a system whose control-law is based on the continuous output may render the system unstable, especially when this sampling period is long compared to the system dynamics. The control design then has to be adapted in order to cope with this issue. In this paper, we consider systems which can be modeled as double integrator with uncertainty on the input since many mechanical systems can be put under such form. We present a control scheme based on an observer using only discrete time measurement and which provides continuous time estimation of the state, combined with a continuous control law, which stabilized a system with second-order dynamics even in the presence of uncertainty. It is further shown that arbitrarily long sampling periods can be dealt with properly setting the control scheme parameters.

Keywords : dynamical system, control law design, sampled output, observer design

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