SYSTEMS WITH NONEQUIDISTANT SAMPLING: CONTROLLABLE? OBSERVABLE? STABLE?

Ge Guo

ABSTRACT

Some qualitative properties of systems with nonequidistant sampling are investigated. First, it is proved that the nonequidistant sampling pattern mentioned in [1] does not affect the controllability and observability of time-varying linear systems during discretization. The result is claimed to be true for linear systems with periodic behavior and time-varying sampling. Second, closed-loop stability conditions are established, respectively, for linear and nonlinear sampled-data systems consisting of continuous plants and linear digital feedback controllers. The stability results are extended to general systems consisting of nonlinear continuous plants and nonlinear digital controllers with time-varying sampling periods.

KeyWords: Nonequidistant sampling, sampled-data control systems, stability; controllability, observability.