

Sampled and Delayed Control of ODE and PDE Systems

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Time-delays are frequently a source of instability, but for some systems, the presence of delay may have a stabilizing effect. A time-delay approach to sampled-data control, where the system is modeled as a continuous-time system with the delayed control input became popular in networked control systems, where the plant and the controller exchange data via communication network. In the present talk delay effects on stability, positivity and control will be discussed. A time-delay approach to sampled-data and network-based control of ODE and PDE systems will be presented, where variable sampling intervals, communication delays and protocol scheduling are taken into account. Differently from other approaches, this approach allows communication delays larger than the sampling intervals. As an application of PDE results, a network-based deployment of multi-agent systems via PDEs will be considered. Finally a very recent time-delay approach, this time to averaging, will be presented. Here the time-delay approach provides constructive upper bounds on the small parameter that preserve the stability.