CENTRO DE INVESTIGACIÓN Y DE ESTUDIOS AVANZADOS DEL IPN

El ***Departamento de Control Automático***

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Seminario Departamental

Attracting Ellipsoid Method for Sliding-Mode Control

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The control of systems in the presence of unmatched perturbations (perturbations that act in different subspaces than the control) is one of the most complex problems in the control theory. The problem of designing a controller that effectively reduces the effect of the unmatched perturbations remains to be open. Different methods for the design of sliding mode controllers have been presented recently and a wide variety of performance criteria have been introduced.

The sliding mode control is known as a very efficient methodology to control dynamic plants operating under uncertain conditions. One of the main features of Sliding Mode controllers is their insensitivity (more than robustness) in the presence of matched perturbations (perturbations that lies on the same subspace as a control).

The presence of actuators affects the performance of sliding mode controllers. The dynamic of the fast actuator (actuator in the most general case) transforms all the perturbation of the system into unmatched perturbations. The dynamic of the actuator requires the modification of the sliding surface (now including the control in the surface) to guarantee convergence and chattering reduction.

The invariant subspace approach is a technique used for the design of controllers for perturbed systems. A particular technique applied for the suppression of bounded perturbations in linear systems is the invariant ellipsoid method.

This talk will present a methodology for the design of the actuator time constant and, the surface and gains of a sliding mode controller to solve the global stabilization problem for perturbed linear systems. The solution obtained by this method corresponds to the quasi-minimal control signal stabilizing the state trajectories to a quasi-minimal ellipsoidal region around the origin. The method is given in terms of a solution of Linear Matrix Inequalities.