Andrzej Bartoszewicz (PL) Sliding modes in continuous and discrete time domains

Abstract: The main purpose of control engineering is to steer the regulated plant in such a way that it operates in a required manner. The desirable performance of the plant should be obtained despite the unpredictable influence of the environment on all parts of the control system, including the plant itself, and no matter if the system designer knows precisely all the parameters of the plant. Even though the parameters may change with time, load and external circumstances, still the system should preserve its nominal properties and ensure the required behaviour of the plant. In other words, the principal objective of control engineering is to design systems which are robust with respect to external disturbances and modelling uncertainty. This objective may be very well achieved using the sliding mode technique which is the main subject of this talk.

The theory of variable structure systems (VSS) with sliding modes is currently one of the most significant research topics within the control engineering domain. Moreover, recently a number of important applications of the theory have also been reported. Therefore, this paper presents a tutorial introduction to the theory of continuous time sliding mode and discrete time quasi-sliding mode control. Important results on the chattering elimination, reaching phase elimination, finite time convergence, optimal time-varying and time-invariant sliding surface design, control of multi-input multi-output systems and control of time-delay systems (including communication networks and logistic supply chains) are discussed.