

Structured Set Membership identification of nonlinear systems with application to vehicles with controlled suspension

Mario Milanese* and Carlo Novara*

*Dipartimento di Automatica e Informatica, Politecnico di Torino, Italy

Abstract - This paper considers an iterative algorithm for the identification of structured nonlinear systems. The systems considered consist of the interconnection of a MIMO linear systems and a MIMO nonlinear system. The considered interconnection structure can represent as particular cases Hammerstein, Wiener or Lur'e systems. A key feature of the proposed method is that the nonlinear subsystem may be dynamic and is not assumed to have a given parametric form. In this way the complexity/accuracy problems posed by the proper choice of the suitable parametrization of the nonlinear subsystem are circumvented. Moreover, the simulation error of the overall model is shown to be a nonincreasing function of the number of algorithm iteration. The effectiveness of the algorithm is tested on the problem of identifying a model for vertical dynamics of vehicles with controlled suspensions from both simulated and experimental data.