Lyapunov Design of a new Model Reference Adaptive Control System using Partial a Priori Information

Alexandros J. Ampsefidis; Jan T. Bialasiewicz; Edward T. Wall

Abstract: A new approach to adaptive model reference control, based on Lyapunov's direct method, is presented. A design procedure for single output systems has been developed and the results verified by computer simulation. The algorithm presented in this paper guarantees asymptotic stability, provided that the transfer function of the equivalent error system is strictly positive real. Since the direct Lyapunov's method is used, the stability conditions are sufficient but not necessary. Therefore, the assumptions are more stringent than they need be. Consequently, as verified by simulation, the algorithm performs very well even if those assumptions are violated. The implementation of the proposed algorithm requires a priori partial information on the plant.