

EE Department Seminar

17 December 2012 , Monday, 3 p.m.

Yorgo Istefanopulos Meeting Lounge (KB 217)

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Adaptive Controller with Delay Compensation for Air-Fuel Ratio Regulation in SI Engines

Abstract

Stringent requirements to maintain low emission levels over the vehicle lifetime constrain the combustion Air-Fuel Ratio (AFR) within a narrow band around the stoichiometric value and hence pose a challenging AFR control problem. In order to match the desired AFR level Universal Exhaust Gas Oxygen (UEGO) sensors have been recently employed within control loops involving nonlinear engine dynamics. Sensor measurement uncertainties and inevitable effects of aging of these sensors motivate the use of online tuning algorithms for the controller gains. We propose an adaptive control structure including an adaptive PI controller and an adaptive Smith predictor which can be used for delay compensation in the presence of parametric uncertainties. The adaptive algorithm is used to estimate only a single parameter which is the time constant of the plant.

All interested are cordially invited