

This paper addresses the design of a fuzzy control system with a fuzzy controller and a fuzzy estimator for a fossil-fuelled drum-type boiler-turbine unit. The fuzzy control method is based on a dynamic Takagi-Sugeno (TS) fuzzy model which has been developed in Habbi et al. [Automatica 39 (2003) 1213] for the nonlinear steam power plant. In the design procedure, a dynamics augmentation is first suggested and a dynamic fuzzy augmented system is determined to deal with the non-minimum phase behaviour of the plant. The global fuzzy control system is designed from a local concept viewpoint using the optimal control theory. To assess the performance of the proposed optimal fuzzy controller, simulations under various operation conditions including actuators saturation are performed over a wide operating range of the physical plant