



ROBUST PASSIVITY-BASED ADAPTIVE CONTROL OF A NONHOLONOMIC MOBILE ROBOT USING FUZZY LOGIC

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ABSTRACT—This paper considers the position control problem of nonholonomic mobile robots with plant uncertainties and external disturbances. A robust passivity-based controller using fuzzy logic is proposed based on the reduced-form dynamic model of nonholonomic systems. The fuzzy logic system, whose parameters are tuned on-line, is introduced to learn the unknown (uncertain) plant dynamics due to the universal approximation property of fuzzy logic systems, and the adaptive compensator is employed to suppress external disturbances and approximation errors. The proposed control scheme can guarantee that all signals in the closed-loop system are uniformly ultimately bounded. Simulation results show the efficiency of the proposed approach.

Key Words: Nonholonomic mobile robot, fuzzy logic, adaptive, uniformly ultimately bounded