

Intelligent Fuzzy Ziegler–Nichols–Based Controller Design of a SPM System
with Parameters Variation

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Abstract

This research applied both the traditional, Ziegler–Nichols–based and Ziegler–Nichols–based fuzzy control methods for mobile satellite antenna tracking system design. Firstly, the antenna tracking and the stabilization loops were roughly designed according to the traditional bandwidth and phase margin requirements. However, the performances would be degraded if the tracking loop gain is reduced due to parameter variations. On the other hand both Ziegler–Nichols–based PID–type and Ziegler–Nichols–based fuzzy controllers were also applied in the tracking loop for refinement. But we can find only the fuzzy controller were better for both low and high antenna tracking loop gains, and the tracking loop gain parameter variations effect can be reduced.

Keyword : intelligent fuzzy controller, hysteresis effect, linear variable differential transformer, load cell, parameter variation, scanning probe microscope, Ziegler–Nichols method, robustness