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区间比例积分微分控制器理论在制导炸弹控制系统设计中的应用

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摘要: 应用区间多项式及区间系统比例积分微分控制器(PID)设计理论, 给出了一种飞行控制系统PID控制器设计方法。该方法同时考虑稳定性指标和时域性能指标。首先求出PID控制器的所有稳定参数集, 再在该集上得出满足时域性能指标的PID控制器参数区域。只需设计一组控制器参数, 就可具有较强的适应被控对象参数变化的能力。理论分析和仿真试验结果表明了该方法的可行性。

关键词: 自动控制技术; 区间系统; 制导炸弹; 比例积分微分控制器

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Application of Interval PID Theorem in the Design of Guidance Bomb Flight Control System

LI Yin_ya, SHENG An_dong, GUO Zhi

Nanjing University of Science and Technology, Nanjing, Jiangsu 210094, China

Abstract: An approach on the design of PID controllers for a flight control system was presented. The method is based on the theorem of interval polynomials and the design of PID controllers for interval plants. The time domain performance specifications and the stability index are incorporated into the design of the PID controllers. All the stabilizing PID controllers are first calculated. Then the intersection region which achieves the time domain performance specifications is computed. Only one group of PID controllers needs designing in the flight control system. The proposed controllers have a strong adaptive characteristic to varying parameters without switching controllers compared with the additional method. Theoretical analysis and simulation results demonstrate the effectiveness of the proposed controllers.

Key Words: automatic control technique; interval plant; guidance bomb; proportional integral differential contr

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