

博士论坛

## 直升机智能PID控制研究

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**摘要** 针对直升机俯仰角度控制和旋转轴速度控制需求, 对模糊PID控制、神经网络PID控制和免疫PID控制在不同控制规律下的系统控制效果进行了对比研究。仿真实验表明, 神经网络PID控制器准确性最高, 系统响应无误差, 稳定性较好, 但响应时间较长; 模糊PID控制器系统动态响应时间较快, 系统稳定性相对最好, 但存在微量误差; 免疫PID控制器控制直升机旋转轴时, 系统响应速度和稳定性明显优于其他两类控制器, 但对俯仰角控制效果差。

**关键词** [神经网络PID](#) [模糊PID](#) [免疫PID](#)

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## Research of intelligent PID controll for helicopter

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### Abstract

For controlling the angle of pitch and velocity of rotate shaft of helicopter, the control performance of fuzzy PID, neural network PID and immune PID is compared each other. The simulation results show that neural network PID controller has the highest accuracy. There is no response error and the stability is good. But it has long response time. The response time of fuzzy PID is faster and its stability is better than those of the other two controllers, but it has little error. When immune PID controller is used to control rotate shaft of helicopter, the response rate and stability are better than the other two controllers. But its control effect to control of angle of pitch control is bad.

**Key words** [netural network PID](#) [fuzzy PID](#) [immune PID](#)

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