Adaptive Control Of Helicopter Pitch Angle And Velocity

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Adaptive Control Of Helicopter Pitch

Two new automatic adaptive control systems are suggested: the former is used for pitch angle control, while the latter is used for control of helicopter pitch angle and velocity; this second system is an extension of the first one. The adaptive control is based on the dynamic inversion principle and the use of neural networks. The two adaptive control systems have reference models, linear dynamic compensators, linear observers, and neural networks.

Adaptive Control of Helicopter Pitch Angle and Velocity ...

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(PDF) Adaptive Control of Helicopter Pitch Angle and Velocity

The problem of pitch angle control the Quanser/LAAS "Helicopter" benchmark laboratory setup is studied. Based on the passification design method and "Implicit Reference Model" approach, two...

(PDF) Adaptive control experiments for LAAS helicopter ...

This paper presents the application of explicit self-tuning regulators in controlling the pitch angle of a model helicopter. An adjustable controller in the R-S-T canonical structure incorporated with an integrator is selected as a controller while the adaptation scheme is based the on-line identified model obtained from weighted recursive least squares algorithm and pole placement design.

Experimental study on servo adaptive pitch control of a ...

In this paper, an adaptive neural network controller is designed for a three-degrees of freedom (3-DOF) helicopter using backstepping technique. As there is uncertain time delays in the system, appropriate Lyapunov–Krasovskii functions are used to compensate the delay and neural networks are introduced to deal with the uncertainty.

Adaptive neural control of a 3-DOF helicopter with unknown ...

Adaptive Model Inversion Control of a Helicopter with Structural Load Limiting. ... Multi-Timescale Nonlinear Robust Control for a Miniature Helicopter. IEEE Transactions on Aerospace and Electronic Systems, Vol. 46, No. 2. Adaptive backstepping integral control of a small-scale helicopter for airdrop missions.

Adaptive Model Inversion Control of a Helicopter with ...

Helicopter - Helicopter - Control functions: A helicopter has four controls: collective pitch control, throttle control, antitorque control, and cyclic pitch control. The collective pitch control is usually found at the pilot’s left hand; it is a lever that moves up and down to change the pitch angle of the main rotor blades. Raising or lowering the pitch control increases or decreases the pitch angle on all blades by the same amount.

Helicopter - Control functions | Britannica

Chen et al. proposed an adaptive neural control for the 3-DOF helicopter system to compensate uncertain time delays. Based on the platform’s seamless interface to Matlab/Simulink, some control approaches that with high calculation cost such as model predictive control [29] and adaptive iterative filtering [30] can be also easily implemented.

Robust attitude control of a 3-DOF helicopter considering ...

In forward flight, a helicopter's flight controls behave more like those in a fixed-wing aircraft. Moving the cyclic forward makes the nose pitch down, thus losing altitude and increasing airspeed. Moving the cyclic back makes the nose pitch up, slowing the helicopter and making it climb.

Helicopter flight controls - Wikipedia

In this paper, we propose robust adaptive neural network (NN) control for helicopter systems by using the Implicit Function Theorem and the Mean Value Theorem, which are useful tools for handling...

Adaptive Neural Network Control of Helicopters | SpringerLink

Abstract: This paper combines interval type-2 fuzzy logic with adaptive control theory for the control of a three degree-of-freedom (DOF) helicopter. This strategy yields robustness to various kinds of uncertainties and guaranteed stability of the closed-loop control system. Thus, precise trajectory

Adaptive Interval Type-2 Fuzzy Logic Control of a Three ...

Collective pitch lever controls the lift produced by the rotor, while the cyclic pitch controls the pitch angle of the rotor blades in their cyclic rotation. This tilts the main rotor tip-path plane to allow forward, backward, or lateral movement of the helicopter.

Helicopter Flight Physics | IntechOpen

control method to enable elevation and pitch angles to track given desired trajectories respectively with the features of non-singularity, adaptation to disturbances, chattering suppression and fast finite-time convergence.

Adaptive Fast Smooth Second-Order Sliding Mode Control for ...

The control objective is to design an effective control algorithm to track and regulate the elevation, pitch and travel angles of the 3-DOF helicopter. Our control scheme is shown in Fig.2. The cascade control architecture is constructed since the 3-DOF helicopter is an under-actuated control system.

Robust Adaptive Integral Backstepping Control of a 3-DOF ...

Typically, unmanned aerial vehicles are underactuated systems, that is, they have fewer independent control inputs than degrees of freedom. In a helicopter, for example, the body axes roll, pitch, yaw, and altitude are fully actuated. However, lateral and longitudinal translational motion is only possible by tilting the thrust vector.

Adaptive Control of Unmanned Aerial Vehicles: Theory and ...

varying, therefore, adaptive control

methods are used to estimate and compensate the model uncertainties. The control objective is to design an effective control algorithm to track and regulate the elevation, pitch and travel angles of the 3-DOF helicopter. Our control scheme is shown in Fig.2.

Robust Adaptive Integral Backstepping Control of a 3-DOF ...

To manage the robustness issue, we present a new approach for an adaptive sliding mode method for controlling a quadrotor helicopter using input augmentation under uncertainty and sensor noise. Sliding mode controllers are robust to bounded uncertainties such as modeling errors, sensor noise and external disturbances.

s12555-009-0311-8 Feedback Linearization vs. Adaptive ...

Much adaptive control work on helicopters has concentrated on improving the tracking performance of attitude commands.12{14Usually a simple outer loop employing basic relationships between attitude and linear acceleration is then used to control the translational dynamics. For many applications this may be su–cient.