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Design of a Sliding Mode Control Using Nonlinear Sliding Surface and Nonlinear Observer Applied to the Trirotor Mini-Aircraft

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Abstract : The control of the trirotor helicopter includes nonlinearities, uncertainties and external perturbations that should be considered in the design of control laws. This paper presents a control strategy for an underactuated six degrees of freedom (6 DOF) trirotor helicopter, based on the coupling of the fuzzy logic control and sliding mode control (SMC). The main purpose of this work is to eliminate the chattering phenomenon. To achieve our purpose we have used a fuzzy logic control to generate the hitting control signal, also the non linear observer is then synthesized in order to estimate the unmeasured states. Finally simulation results are included to indicate the trirotor UAV with the proposed controller can greatly alleviate the chattering effect and remain robust to the external disturbances.

Keywords : fuzzy sliding mode control, trirotor helicopter, dynamic modelling, underactuated systems
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