

Design and Simulation of Variable Air Volume Air Conditioning System Based on Improved Sliding Mode Control

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Abstract : The main purpose of the VAV (Variable Air Volume) in Heating, Ventilation, and Air Conditioning (HVAC) system is to reduce energy consumption and make the buildings comfortable for the occupants. For better performance of the air conditioning system, different control techniques have been developed. In this paper, an Improved Sliding Mode Control (ISMC), based on Power Rate Exponential Reaching Law (PRERL), has been implemented on a VAV air conditioning system. Through the proposed technique, fast response and robustness have been achieved. To verify the efficacy of ISMC, a comparison of the suggested control technique has been made with Exponential Reaching Law (ERL) based SMC. And secondly, chattering, which is unfavorable as it deteriorates the mechanical parts of the air conditioning system by the continuous movement of the mechanical parts and consequently it increases the energy loss in the air conditioning system, has been alleviated. MATLAB/SIMULINK results show the effectiveness of the utilized scheme, which ensures the enhancement of the energy efficiency of the VAV air conditioning system.

Keywords : PID, SMC, HVAC, PRERL, feedback linearization, VAV, chattering

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