

## **A Combined High Gain-Higher Order Sliding Mode Controller for a Class of Uncertain Nonlinear Systems**

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**Abstract :** The use of standard sliding mode controller, usually, leads to the appearing of an undesirable chattering phenomenon affecting the control signal. Such problem can be overcome using a higher-order sliding mode controller (HOSMC) which preserves the main properties of the standard sliding mode and deliberately increases the control smoothness. In this paper, we propose a new HOSMC for a class of uncertain multi-input multi-output nonlinear systems. Based on high gain and integral sliding mode paradigms, the established control scheme removes theoretically the chattering phenomenon and provides the stability of the control system. Numerical simulations are developed to show the effectiveness of the proposed controller when applied to solve a control problem of two water levels into a quadruple-tank process.

**Keywords :** nonlinear systems, sliding mode control, high gain, higher order

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