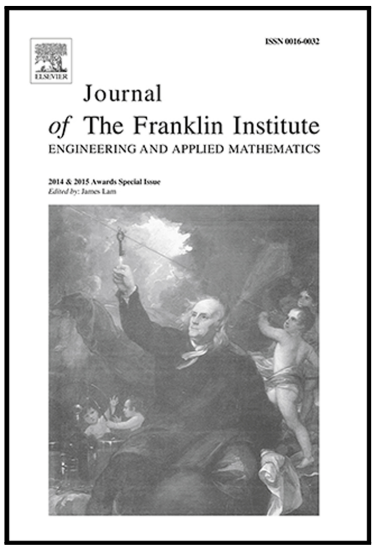

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José Antonio González, Antonio Barreiro, Sebastián Dormido, Alfonso Baños

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Non linear adaptive sliding mode control with fast non-overshooting responses and chattering avoidance.

José Antonio González[a], Antonio Barreiro[b], Sebastián Dormido[c], Alfonso Baños[d]

[a] *Centro Tecnológico de Automoción de Galicia, Spain*
[b] *Dept. de Ingeniería de Sistemas y Automática, E.T.S.I.Industriales , University of Vigo, Spain*
[c] *Dept. Informática y Automática, UNED Madrid, Spain*
[d] *Dep. Informática y Sistemas, Universidad de Murcia, Spain*

Abstract

It is well known that the main problem hindering the application of the sliding mode control (SMC) is the chattering effect produced by the use of discontinuous switching control functions. In this paper, a combination of several specialized SMC controllers is proposed in order to solve this problem and obtain high accuracy steady state sliding motions in case of a class of MIMO nonlinear systems with external matched disturbances and plant uncertainty. The developed method uses a disturbance observer, a nominal controller that assumes the cancellation of the disturbance inputs and an error controller that guides the trajectory of the plant states using the nominal response as a tracking reference. The design of the SMC control laws is implemented using an adaptive nonlinear sliding mode definition that creates fast non-overshooting responses over the selected output variables. Numerical simulation results are given to illustrate the effectiveness of the proposed SMC.

Keywords: sliding mode; adaptive sliding surfaces; boundary layer; chattering avoidance

Email addresses: jose.gonzalez@ctag.com (José Antonio González), abarreiro@uvigo.es (Antonio Barreiro), sdormido@dia.uned.es (Sebastián Dormido), abanos@um.es (Alfonso Baños)