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**Robust stabilization of uncertain 2-D discrete-time delayed systems using sliding mode control.** (English) [Zbl 1423.93338](#)

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**Summary:** This paper aims to solve the problem of sliding mode control for an uncertain two-dimensional (2-D) systems with states having time-varying delays. The uncertainties in the system dynamics are constituted of mismatched uncertain parameters and the unknown nonlinear bounded function. The proposed problem utilizes the model transformation approach. By segregating the proper Lyapunov-Krasovskii functional in concert with the improved version of Wirtinger-based summation inequality, sufficient solvability conditions for the existence of linear switching surfaces have been put forward, which ensure the asymptotical stability of the reduced-order equivalent sliding mode dynamics. Then, we solve the controller synthesis problem by extending the recently proposed reaching law to 2-D systems, whose proportional part is appropriately scaled by the factor that does not depend on some constant terms but rather on current switching surface's value, which in turn ensures the faster convergence and better robustness against uncertainties. Finally, the proposed results have been validated through an implementation to a suitable physical system.

**MSC:**

- [93D21](#) Adaptive or robust stabilization
- [93B12](#) Variable structure systems
- [93C55](#) Discrete-time control/observation systems
- [93C41](#) Control/observation systems with incomplete information

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**Keywords:**

[robust stabilization](#); [uncertain 2-D discrete-time delayed systems](#); [sliding mode control](#)

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