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A NEW LIMIT CYCLE GENERATION METHOD AND THEORETICAL ANALYSIS FOR MULTI-MODAL AND 2-DIMENSIONAL PIECEWISE AFFINE SYSTEMS

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Abstract

This paper is devoted to development of a new synthesis method of a multi-modal and 2-dimensional piecewise affine system that generates a desired stable limit cycle and investigation of some characteristics for the system. The new proposed method has some advantages on the convergence property of solution trajectories to a desired limit cycle in comparison with the previous one. First, the problem formulation on a piecewise affine system and a desired polygonal closed curve is presented. Next, a new synthesis method of a piecewise affine system is derived. Mathematical guarantee on the existence and the uniqueness of the limit cycle is shown. The convergence property for solution trajectories of the system is also investigated. After that, a setting method of the rotation direction and the period of a limit cycle solution trajectory is proposed. Finally, some numerical simulation results illustrate the effectiveness and the application potentiality of the new synthesis method.

Key Words : *Piecewise affine systems, Limit cycles, Oscillators, System synthesis.*