TOPOLOGICAL STRUCTURE OF CHATTERING OPTIMAL SYNTHESES

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The term chattering control means the optimal control with countable number of switches on a finite time interval. The theory of chattering control is gathering force as a separate branch of the geometrical optimal control theory. Up to now the main attention was paid to control systems with single input. The multiinput control problems with chattering arcs are as yet little understood. It was found an explicite analitic expression for some optimal trajectories of linear-quadratic problems having control in the unit disk. The part of switching accumulation points play here points of discontinuity of the second kind of the control function.

We investigate a phenomenon inherent to multiinput problems with the control taking values in polytops. We call this phenomenon as successively inserted chattering bundles. We mean by this term an optimal synthesis having the following structure. The phase space is fibered over strata of maximal dimension of the stratified singular manifold W by fibers containing chattering trajectories (chattering fibers); each stratum of W, being the base of the preceding bundle, is fibered in his turn by chattering fibers over the stratum of less dimension which belongs to its boundary and so on up to the stratum of minimal dimension which consists of smooth singular trajectories.