Tracking of chained form systems via output feedback

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In recent years a lot of interest has been devoted to (mainly) stabilization and tracking of non-holonomic dynamic systems. One of the reasons for the attention is the lack of a continuous static state-feedback control since Brockett's necessary condition for smooth stabilization is not met, see [1]. The proposed solutions to this problem follow mainly two routes, discontinuous and/or time-varying control. For a good overview, see the survey paper [2] and the references therein.

It is well known that the kinematic model of several nonholonomic systems can be transformed into a *chained form system*. In this paper we consider the output tracking problem for chained form systems. Our results are based on the construction of a time varying state-feedback controller in combination with an observer. However, the stability analysis and design is based on results for (time-varying) cascaded systems [3]. In the design we divide the chained form into a cascade of two sub-systems which we can stabilize independently of each other, and furthermore the same cascade results also apply for the controller-observer combination.

References

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