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A Study on Stabilization of Nonholonomic Systems Via a Hybrid Control Method

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Abstract: In this paper, we consider a hybrid control strategy for stabilization of nonholonomic systems. In particular, we deal with a typical nonholonomic system, namely a two-wheeled vehicle. We first rewrite the system in a chained form, and then transform it into a nonholonomic integrator (NHI) system. Finally, we apply and modify the hybrid control method for the NHI system, so that the entire system is exponentially stable. We provide a simulation example to demonstrate the effectiveness of the transformation and the control, and give some analysis together with an example for the case where there are constraints on control inputs. We also extend the discussion to the case of four-wheeled vehicles.

Keywords: *Nonholonomic system; two(four)-wheeled vehicle; hybrid control; chained form; nonholonomic integrator; exponential stability/stabilization; switching strategy.*

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