

Implementation of Sliding-Mode Control

Super-Twisting Control is a second-order Sliding-Mode control method. Sliding-Mode controllers are nonlinear controllers utilizing the sign of the control error. Unlike linear controllers, they are robust with respect to disturbances in the plant. However, the discrete-time implementation of Sliding-Mode control is challenging, due to the discontinuity (jump from -1 to 1) of the sign of the control error at the control goal where the error is zero. With conventional discretization methods this leads to discretization chattering. New discretization methods avoid this type of chattering.

The goal of this project is the implementation of various discrete-time realizations of the Super-Twisting controller on real-life models in the laboratory. Will the choice of the discretization method make a difference in a real-world application?

Within the thesis you will

- Work in an active field of research.
- Gain understanding of nonlinear control methods.
- Implement Super-Twisting control on hardware:
 - Speed-control of a DC-motor and/or
 - Control of the current in a series-resonator.
- Compare various discretization methods.

Extendable to a Master seminar project or Master thesis.

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