

Tuning of Fractional-Order Proportional-Integral-Derivative Controllers

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Abstract:

As the application of fractional-order calculus in control engineering becomes more and more popular, the efficient but also robust tuning of Fractional-Order Proportional-Integral-Derivative (FOPID) controllers is highly demanded. Thus, the thesis should be focused on tuning of FOPID controllers, their robustness, and the aspects of practical implementation. The student should map the main existing approaches to FOPID design and tuning in the literature and perform a comparative analysis. Subsequently, he/she should seek for a niche for improvements of a FOPID control design method. The obtained results should be verified not only by means of simulations but also via real laboratory control experiments.

Literature:

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- [4] PADHEE, Subhransu, et al. A novel evolutionary tuning method for fractional order PID controller. *International Journal of Soft Computing and Engineering*, 2011, 1.3: 1-9.
- [5] PADULA, Fabrizio; VISIOLI, Antonio. Tuning rules for optimal PID and fractional-order PID controllers. *Journal of Process Control*, 2011, 21.1: 69-81.
- [6] TEJADO, Inés, et al. Back to basics: Meaning of the parameters of fractional order PID controllers. *Mathematics*, 2019, 7.6: 530.
- [7] DASTJERDI, Ali Ahmadi; SAIKUMAR, Niranjana; HOSSEINNIA, S. Hassan. Tuning guidelines for fractional order PID controllers: Rules of thumb. *Mechatronics*, 2018, 56: 26-36.
- [8] TEPLJAKOV, Aleksei, et al. Towards industrialization of FOPID controllers: A survey on milestones of fractional-order control and pathways for future developments. *IEEE Access*, 2021, 9: 21016-21042.