

Stability Analysis and Controller Design via Integral Quadratic Constraints for Lur'e Systems

Seminar Project (2-4 students, Homeoffice)

Many systems in practice can be modelled as Lur'e-type nonlinear systems, for example flexible link robot arm, or some bio-chemical process... and Lur'e systems have been long researched in the control science literature.

Integral Quadratic Constraints (IQC) (see, for example, [1]) is a powerful framework for stability analysis and controller design for systems with uncertain nonlinearity.

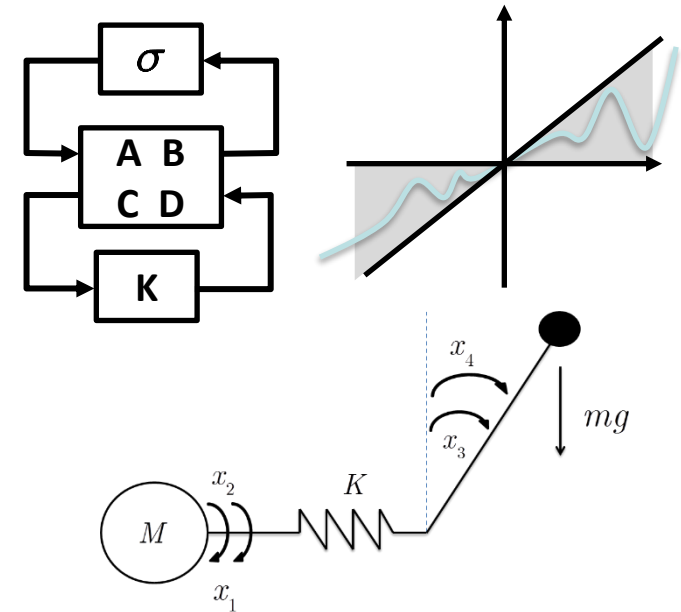
In this project, the students will apply the IQC framework for the Lur'e systems.

The tasks for the students (working as a group) are:

- Understand the IQC framework
- Formulate the control problem with Lur'e systems by using this framework
- Conduct a simulation/numerical example in Matlab to illustrate the approach

The suggested system for simulation can be a flexible link robot arm in [2]. However, the students can propose the system that they want to work with.

The advising will be preferably done in English. If you have any questions, feel free to contact us.



[1] Ross Boczar, Laurent Lessard, Andrew Packard, Benjamin Recht, "Exponential Stability Analysis via Integral Quadratic Constraints" arXiv:1706.01337.

[2] A. Howell and J. K. Hedrick, "Nonlinear observer design via convex optimization," Proceedings of the 2002 American Control Conference (IEEE Cat. No.CH37301), 2002, pp. 2088-2093 vol.3.

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