International Federation of Automatic Control

Invites you on
Thursday, April 10, 2025
at 16:15 s.t.

to the lecture

“Descriptor System Modeling for Robustness in Control”

Speaker:
Dr. Dimitri Peaucelle
IFAC Vice-President for Operations, Secretary

The lecture will take place in person at the
TU Vienna (**Hörsaal EI 2 Pichelmayer**,
Gußhausstr. 25-25a,
2. Stock Raumnummer: CF0235)
and via Zoom video conference.
The LINK will be distributed after registration.

Please RSVP to:
IFAC SECRETARIAT via e-mail:
secretariat@ifac-control.org

Abstract

“Descriptor System Modeling for Robustness in Control”

by Dr. Dimitri Peaucelle
LAAS-CNRS
Toulouse, France

The robust control framework considers systems regulated close to an equilibrium point or a trajectory. Under these assumptions the systems are linear but dependent of many intricate features such as uncertainties, neglected dynamics, time-dependent parameters, isolated non-linearities, time-delays… Robustness is achieved when some performance can be assessed even for the worst configuration of these features. Mathematically, it boils down to proving that some complicated non-linear function of many indeterminates is negative when these indeterminates are constrained in sets that are themselves described by non-linear equations.

In this talk we show that for many cases the Descriptor System Modeling that combines Algebraic and Differential Equations is highly useful to simplify (linearize) the problems. Combined to the S-variable approach which cleverly exploits Finisler’s lemma, it provides easy to code Semi-Definite Programming relaxations. These numerically tractable relaxations are conservative, yet Descriptor-based liftings of the model allows to build hierarchies of relaxations with decreasing conservatism. In the talk we will give an insight on these theoretical results illustrated on some simple examples.

Program

16.15 **Introduction**
Prof. Christian Ott, AT
IFAC Council member

16.30 **Descriptor System Modeling for Robustness in Control**

Speaker:
Dr. Dimitri Peaucelle
IFAC Vice-President for Operations
LAAS-CNRS, Toulouse, France

17.15 **Discussion/Q&A**
Moderation
Prof. Christian Ott
ACIN – TU Wien