



# 北京理工大学

## 数学与统计学院学术报告

# Generalized Homogenization of Linear Controllers: Theory and Experiments

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### 摘要:

Homogeneity is a certain invariance of a mathematical object (a function, a set, etc) with respect to a class of transformations called dilations. All linear and many essentially nonlinear models of mathematical physics are homogeneous (symmetric) in some sense. Homogeneous control laws appear as solutions of various control problems. Similarly to the linear case, an asymptotic stability of a homogeneous system implies its robustness (input-to-state stability) with respect to a certain class of parametric uncertainties and exogenous perturbations. Homogeneity is the simplest way to design a finite/fixed-time stabilizing controllers by means of a tuning of the homogeneity degree. In this talk, a methodology for upgrading of existing linear controllers to homogeneous feedback laws is presented. An algorithm of transformation of the control law is developed such that any degradation of the control quality is prevented. Theoretical investigations are supported by real experiments with various mechanical systems.

### 个人简介:

Andrey Polyakov was graduated from Voronezh State University (Russia) in 2003 as applied mathematician. In 2005 he received PhD degree in System Analysis, Control and Information Processing from the same university. In 2007-2008 he was a postdoc in the Mexican research center CINVESTAV. In 2004-2010 he was Assistant Professor and, next, an Associate Professor of the Voronezh State University, Russia. In 2010-2014 he had a position of Leading Researcher of the Institute of Control Sciences of Russian Academy of Sciences. Since 2013 he is a researcher in the Inria Center of the University of Lille, France. He is author of 3 books and more than 100 journal papers in the field of automatic control. His main research interests are nonlinear and robust control theory for both finite and infinite dimensional systems.