PROJECTS

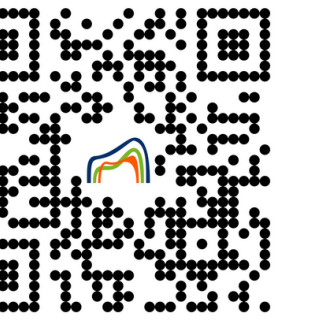## Chair for Dynamics, Control, Machine Learning and Numerics. Alexander von Humboldt Professorship

Enrique Zuazua

Friedrich-Alexander-Universität Erlangen-Nürnberg

A growing group of scientists who enjoy interdisciplinary work at FAU, Friedrich-Alexander-Universität Erlangen-Nürnberg in Germany. Co-funded by the Alexander von Humboldt-Foundation (AvH) we have a wide expertise in the areas of Applied Mathematics, Machine Learning, PDE analysis, control theory, numerical analysis and computational mathematics.

TRR154. C03. Nodal control and the turnpike phenomenon

Martin Gugat • Michael Schuster

Friedrich-Alexander-Universität Erlangen-Nürnberg

Rüdiger Schultz

University of Duisburg-Essen

Turnpike results provide connections between the solutions of transient and the corresponding stationary optimal control problems that are often used as models in the control of gas transport networks. In this way turnpike results give a theoretical foundation for the approximation of transient optimal controls by the solutions of stationary optimal control problems that have a simpler structure.

TRR154. C05. Observer-based data assimilation for time dependent flows on gasnetworks

Jan Giesselmann
Technical University of Darmstadt

Martin Gugat
Friedrich-Alexander-Universität Erlangen-Nürnberg

Teresa Kunkel
Technical University of Darmstadt

This project studies data assimilation methods for models of compressible flows in gas networks. The basic idea of data assimilation is to include measurement data into simulations during runtime in order to make their results more precise and more reliable.

## Endowing Artificial Intelligence with Control-Theoretic Guarantees

Enrique Zuazua

Friedrich-Alexander-Universität Erlangen-Nürnberg

Miroslav Krstic

University of California

Data-Based Optimization in Real Time for Dynamic Systems. BaCaTeC – HighTech Research between Bavaria and California.Unlike most machine learning algorithms, which have yet to be equipped with guarantees of convergence and stability in real time for feedback applications to dynamical systems.
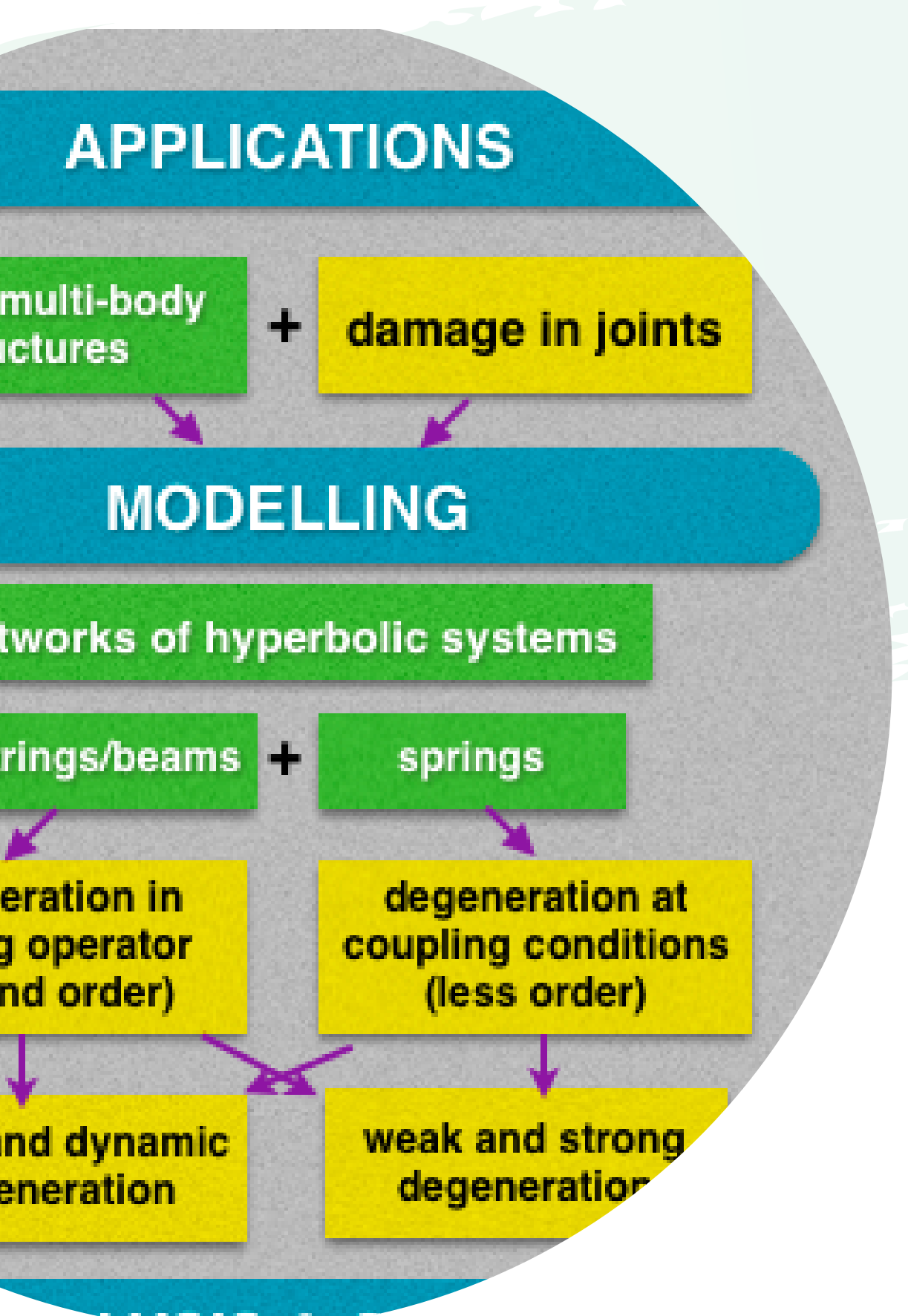
Analysis and Control of Nonlinear Hyperbolic Systems with Degeneration on Networks

Yue Wang

Friedrich-Alexander-Universität Erlangen-Nürnberg

This project focusses on control problems for elastic bodies arising in particular in structural mechanics, e.g. flexible multi-link structures, pipe-systems, string-mass-spring-systems or highly flexible robots, where degeneration (damage and failure) takes place at the boundaries or in multiple joints.

Doctoral School of Information and Biomedical Technologies Polish Academy of Sciences

Jan Sokolowski
Université de Lorraine

Martin Gugat
Friedrich-Alexander-Universität Erlangen-Nürnberg

Data-Based Optimization in Real Time for Dynamic Systems. BaCaTeC – HighTech Research between Bavaria and California.Unlike most machine learning algorithms, which have yet to be equipped with guarantees of convergence and stability in real time for feedback applications to dynamical systems.