Dr. Yue Wang

Analysis and Applied Mathematics - Partial Differential Equations, Control

yue.wang@fau.de +49 1520 748 7491
Cauerstr.11 , 91058 Erlangen, Germany https://dcn.nat.fau.eu/yue-wang

"I am always loving Mathematics – it opens a window onto the order of nature hidden – brings me a story of life to understand the world I am in – and involves me in it emotionally and intellectually. "

Scientific Position

2022 – Now | **Friedrich- Alexander Universität (FAU), Erlangen, Germany**
at *Research Center for Mathematics of Data (MoD)*
Senior Scientist and **Project Leader** of DFG research project.

2021 – Now | **FAU Erlangen- Nürenberg, Germany**
at *Chair for Dynamics, Control and Numerics (DCN)| Department of Data Science (DDS)*
Postdoc. Head: Enrique Zuazua | https://dcn.nat.fau.eu/

2019 – 2021 | **FAU Erlangen- Nürenberg, Germany**
at *Chair for applied mathematics II| Department of Mathematics*
Postdoc. for DFG project "Damage modeling and optimal control Head: Prof. Günter Leugering.

Education

2015 – 2019 | **Fudan University (FDU), Shanghai, China**
PhD in Applied Mathematics
at **Shanghai Center for Mathematical Sciences** *(national research institute)*
at **Laboratoire International Associé Sino-Français de Mathématiques Appliquées**

- Completed MSc-program in 1.5 year, and then got Doctor degree in 2.5 year.
- Advisor: Tatsien Li
- Thesis: *Exact boundary Controllability for Wave Equations with Dynamical Boundary Conditions and Partial Nodal Profile Control for Wave Equation (2019)*.
- obtained 2 third-party funding for individual research projects;
- awarded 11 scholarships, 7 individual honors and 3 collective honors.
- GPA 3.81/4.0 (Rank 1st)

2011 – 2015 | **Fudan University (FDU), Shanghai, China**
BSc in Mathematics and applied Mathematics
at **Department of Mathematics**

- received Freshman Scholarship (2011), and selected into Su Buchin (Mathematician) Top Talent Training Program (2013)
- obtained 6 scholarships; 7 personal prizes.
- GPA 3.64/4.0 (Rank 10% out of 183 students);
- Thesis:*The Synchronization Behavior of Kuramoto Model* (2015), supervised by Hao Wu.

Domains of Expertise: *Partial Differential Equations, Analysis* and *Control Theory*. My research work focuses on networked nonlinear hyperbolic systems in which solutions can be tracked as propagating waves. In the field, my expertise is to develop and apply mathematical methods to physical-meaning models, understand and control the dynamics of PDEs arising in real world applications.

Research Projects

Main Applicant (successful +)

1. (2022-2024) DFG WA 5144/1-1, Individual research project entitled *Analysis and Control of Nonlinear Hyperbolic Systems with Degeneration on Networks*, funded by **DFG No. 504042427**.
2. (2022-2023) Control of Hyperbolic Systems on Large Scale Networks including Degeneration: a Combined Model and Data Based Approach, which successfully obtained **a university funding** named *Emerging Talents Initiative (ETI)*.
3. (2018-2019) Individual research project entitled *Exact boundary controllability for coupled wave equations with dynamical boundary conditions*, which successfully obtained **a third-party funding** named *Weng Hongwu (PKU) Scientific Research and Innovation Fund*.
4. (2017-2019) Individual research project entitled *Control Theory on planar or spacial string networks: controllability and nodal control for quasilinear hyperbolic systems*, which successfully obtained **a university funding** named *Graduate Research Funding of Fudan University*.

Participant with research work

1. (2021-2022) Activities in the areas of Applied Mathematics, PDE analysis, control theory, numerical analysis and computational mathematics, my position is funded by Alexander von Humboldt Stiftung/Foundation.
2. (2019-2021) DFG-L 595/31-1, *Damage Modeling and Optimal Controls*, joint research with G. Leugering (FAU) and P. Kogut (Oles Honchar DNU).
3. (2019-2021) European Union's H2020 programme No. 765579. Research assistant on PhD-thesis in project Conflex (control of flexible structures and fluid structure interaction).
4. (2015-2019) Joint research with T. Li (FDU) in National Basic Research Program of China 2013CB834100 and then in NSFC-11121101, also with G. Leugering (FAU) in DFG-TRR154 (Mathematical Modelling, Simulation and Optimization using the example of Gas Networks).

Applications with pending decision

1. PI and manager. Sino-German Mobility Programme entitled *Control, inversion and numerics for Partial Differential Equations (CIN-PDE)*, submitted on 28.09.2021 to DFG and NSFC.

Leadership

2022 – now | **Research Project leadership (DFG-Project WA 5144/1-1), Germany**
This project is funded by DFG Individual Research Grant. I expected to evolve the supervision of master thesis in the research profile of the project.

2017 – 2019 | **Junior Group Leader and Counselor, China**
of a graduates-training group with 88 fresh graduates (47 Phd, 41 Master students enrolled in 2017) at Department of Mathematics, FDU.

- 61/88 got Master or Doctor of Science Degrees in 2020, 27/88 passed PhD qualification in 2019 (planned to graduate with Doctor of Science Degree in 2022).
- 8/88 obtained National scholarships, group awarded 3 collective honors.

Awards and Scholarships (in a selection)

Awards

1. Kovalevskaya Grant (European Mathematical Society & Deutsche Mathematiker Vereinigung & the Local Organizing Committee of the St. Petersburg ICM, Russia) (2022)
2. Emerging Talents Initiative, FAU, Germany (2021)
3. Shanghai Outstanding Doctoral Graduates (Top 5%) (2019)
4. FDU Distinguished Students of Academics (Top 0.05% in FDU) (2019)
5. FDU Role Model Students (Top 0.05% in FDU) (2018)
6. FDU Outstanding Bachelor Graduates (Top 8%) (2015)

Scholarships

1. National Scholarship for PhD (2017-2018)
2. National Scholarship for MSc (2015-2016)
3. FDU First Prize Excellent PhD candidate scholarship (2017)
4. FDU First Prize Excellent undergraduates scholarship (2013)
5. FDU Freshman Scholarship (2011)

Teaching Activities and Administration Affair

2015 – 2019 **Exercises in mathematics, Department of Mathematics in FDU** of graduate/undergraduate courses:

1. Modern Partial Differential Equations (2018-2019).
2. Numerical Solutions of Differential Equations (2017).
3. Equations of Mathematical Physics (2016).
4. Functional Analysis (2015-2016).

Jun. 2018 **Teacher Assistant, International Summer School of Mathematical Biology: Modeling and Analysis, Shanghai.**
of Prof. Avner Friedman (OSU) and Prof. Yuan Lou (OSU).

2017 – 2018 **Lecturer, Fudan International High School**
in mathematics for students in IB Diploma Programme.

2016 – 2017 **Assistant Manager, FDU**
of Mathematics Library.

During my stay in Germany, I have advised 2 PhD theses (2019-2021), and been involved a bachelor internship in FAU.

Academic Events

Speaker (Invited)

2022 *Modeling and Control of Nonlinear Hyperbolic Systems*, Seminar talk in the research group of Dynamics and Control, Department of Mechanical Engineering, Feb. 17, Eindhoven, Netherlands.

2020 *Controllability of Nodal Profile for a Network of Vibrating Strings*, Mini-Workshop on Hyperbolic Problems, Oct. 2, Erlangen, Germany.

2019 *Exact Boundary Controllability for Coupled Wave Equations with Dynamical Boundary Conditions*, CAA Workshop: Waves on a nutshell, Nov. 11, Chair in Applied Analysis (Alexander von Humboldt-Professorship), Erlangen, Germany.

2019 *Exact Controllabiliy of Partial Nodal Profile for Wave Equations*, LIASFMA Workshop on the Exact Boundary Controllability of Nodal Profile for 1-D Hyperbolic Systems, Apr.2, Shanghai, China.

Participant (in a selection)

2021 | Oberwolfach Workshop: Challenges in Optimization with Complex PDE-systems, Germany.

2019 | LIASFMA: China-Italy Conference on PDEs and Their Applications, Shanghai, China.

2018 | ICM (International Congress of Mathematicians), Rio de Janeiro, Brazil.
International Conference on Contemporary Applied Mathematics, Shanghai, China.

2015 | ICIAM (International Congress on Industrial and Applied Mathematics), Beijing, China.

Internatial Summer School (Selected)

2017 | LIASFMA School and Workshop on Harmonic Analysis and Wave Equations, Shanghai, China.

2016 | LIASFMA Autumn School and Workshop on Control and Inverse Problems for Partial Differential Equations, Hangzhou, China.

2015 | LIASFMA 2015 Shanghai Summer School on 'One-dimensional Hyperbolic Conservation Laws and Their Applications', Shanghai, China.

Extracurricular activities

I have been systematically trained in competitive sports - especially in running, volleyball and gymnastics. I participated in university-level or municipal-level competitions:

Runner | Gold Medal, *Mixed Relay*; Silver medal, *Women's 4*100m Relay*; Silver medal, *Standing long jump*; in University 54th Games, FDU (2014).
Gold Medal, *Mixed Relay*; Gold Medal, *Women's 4*100m Relay*; Gold Medal, *Standing long jump*; in University 53th Games, FDU (2013).
First Prize (Group), *Winter long distance race*, FDU (2013).

Gymnast | First Prize, *Group aerobics competition*, Shanghai (2015).
Second Prize, *Group aerobics competition*, Shanghai (2014, 2013, 2012).

In addition, I organized a team of volunteers, consisting of 27 graduates from FDU. I and this team have provided long-term services in FDU, in District, and major international exhibitions/ conferences in Shanghai from 2015 until 2019. Our team is awarded

Volunteer | *Excellent volunteer team* (2018) at Yangpu District, Shanghai.

Individual and Collective Awards and Honors (complete)

Awards

1. Kovalevskaya Grant for International Congress of Mathematicians 2022, Russia (2022)
2. Kovalevskaya Travel Grant, European Mathematical Society & Deutsche Mathematiker Vereinigung (2022)
3. Emerging Talents Initiative, FAU, Germany (01.2022-01.2023)
4. Shanghai Outstanding Doctoral Graduates (Top 5%) (2019)
5. FDU Distinguished Students of Academics (Top 0.05% in FDU) (2019)
6. Excellent Communist Youth League, FDU (2019)
7. Counselor Award, FDU (2018)
8. FDU Role Model Students (Top 0.05% in FDU) (2018)
9. Distinguished Fudan Youth, FDU (2017)
10. FDU Outstanding Student (2016)
11. FDU Outstanding Bachelor Graduates (Top 8%) (2015)

Collective Honors

1. *Applied PDEs research group led by Prof.T.Li* awarded Top Ten Graduate Instructor Team, FDU (2017, I was the speaker).
2. *Graduates in mathematics training group led by Y. Wang* awarded Outstanding Student Collective Model of Fudan University, FDU (2018).
3. *Graduates in mathematics volunteer group led by Y. Wang* Excellent volunteer team, Wujiaochang Community, Yangpu District, Shanghai (2018).

Scholarships

1. National Scholarship for PhD (2017-2018)
2. National Scholarship for MSc (2015-2016)
3. French Reinsurance Scholarship (2017-2018)
4. Cai Tongyu Scholarship (2016-2017)
5. FDU First Prize Excellent PhD candidate scholarship (2017)
6. FDU First Prize graduate scholarship (6 times in each semester, from 2015 until 2018)
7. FDU Second Class Undergraduate Excellent Student Scholarship (2014, 2015)
8. FDU First Prize Excellent undergraduates scholarship - Guanghua Scholarship (2013)
9. FDU Third Class Undergraduate Excellent Student Scholarship (2012)
10. FDU Freshman Scholarship (2011)

Contact information of three references.

Prof. Enrique Zuazua. **enrique.zuazua@fau.de** `https://dcn.nat.fau.eu/enrique-zuazua/`
Chair for Dynamics, Control and Numerics/ Alexander von Humboldt-Professorship, Department of Data Science (DDS) & Center for Mathematics of Data | CMoD, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Cauerstr. 11 (03.322), 91058 Erlangen, Germany.

Prof. Günter Leugering. **guenter.leugering@fau.de** `https://www.math.fau.de/person/leugering/`
Department of Mathematics, Friedrich-Alexander University, Erlangen-Nuremberg, Cauerstrasse 11, 91058 Erlangen, Germany.

Prof. Tatsien Li. **dqli@fudan.edu.cn** `https://www.ias.cityu.edu.hk/en/profile/li-tatsien`
School of Mathematical Sciences, Fudan University, Shanghai 200433, China.& Shanghai Key Laboratory for Contemporary Applied Mathematic & Nonlinear Mathematical Modeling and Methods Laboratory, Shanghai 200433, China.

List of Publications

Dr. Yue Wang yue.wang@fau.de
Research area: Analysis and Applied Mathematics - PDEs, Control

Book

2021 1. T. Li, B. Rao. Ed. and Trans. by **Y. Wang**. Boundary Sychronization for Hyperbolic Systems (Chinese Edition), Series in Modern Mathematics, Shanghai Scientific & Technical Publishers.

Peer-reviewed Papers (published by date)

2021
2. Leugering, G., Rodriguez, C. & **Wang, Y.** Nodal profile control for networks of geometrically exact beams. *Journal de Mathématiques Pures et Appliquées, doi:10.1016/j.matpur.2021.07.007* (2021).
3. Vergara-Hermosilla, G., Leugering, G. & **Wang, Y.** Boundary controllability of a system modelling a partially immersed obstacle. *Control, Optimisation and Calculus of Variations, 27* (2021).
4. **Wang, Y.** & Li, T. Exact boundary controllability of partial nodal profile for wave equations. *Nonlinear Analysis: Real World Applications, 64* (2021).

2020
5. **Wang, Y.**, Leugering, G. & Li, T. Exact Boundary Controllability for the Spatial Vibration of String with Dynamical Boundary Conditions. *Chinese Annals of Mathematics, Series B, 41, 325-334* (2020).

2019
6. Kogut, P., Leugering, G., Kupenko, O. & **Wang, Y.** A note on weighted sobolev spaces related to weakly and strongly degenerate differential operators. *Journal of Optimization Theory and Applications, Vol.27, Issue 2, 1-27* (2019).
7. Leugering, G., Li, T. & **Wang, Y.** 1-d wave equations coupled via viscoelastic springs and masses: boundary controllability of a quasilinear and exponential stabilizability of a linear model. *Trends in Control Theory and PDEs, Springer INDAM Ser., 32, Spring, Cham, 139-165* (2019).
8. **Wang, Y.**, Leugering, G. & Li, T. Exact boundary controllability for a coupled system of quasilinear wave equations with dynamical boundary conditions. *Nonlinear Analysis: Real World Applications. 49, 71-89* (2019).

2018
9. Li, T. & **Wang, Y.** Exact boundary controllability on a planar tree-like network of vibrating strings with dynamical boundary conditions. *Journal of Mathematical Study, Vol.51, No.3, 227-252* (2018).

2017
10. **Wang, Y.**, Leugering, G. & Li, T. Exact boundary controllability for 1-D quasilinear wave equations with dynamical boundary conditions. *Mathematical Methods in the Applied Sciences 40, no. 10, 3808-3820* (2017).

Papers submitted or under preparation

i. G. Leugering, S. Micu, I. Roventa, **Y. Wang**, Controllability properties of a system consisting of two elastic strings with tip-masses connected by an elastic spring. Submitted (2021).
ii. G. Leugering, C. Rodriguez, **Y. Wang**, Exact controllability of networks of elastic strings, Springs and Masses. In preparation (2021).
iii. **Y. Wang**, G. Leugering, T. Li, HUM method to the exact boundary controllability of nodal profile for vibrating strings. A poster at Department of Data Science in FAU (based on a talk given at the Mini-workshop on hyperbolic problem in 2020).