

Group   Projects   Publications

---



## Konstantin "Kostya" Turitsyn

Associate Professor (without tenure)

*Massachusetts Institute of Technology*

*Department of Mechanical Engineering*

*77 Massachusetts Ave, [3-336](#)*

*Phone: +1-(617)-452-3064*

*E-mail: [turitsyn@mit.edu](mailto:turitsyn@mit.edu)*

[Google Scholar Profile](#)

Group Projects  
Dmitry Podolsky

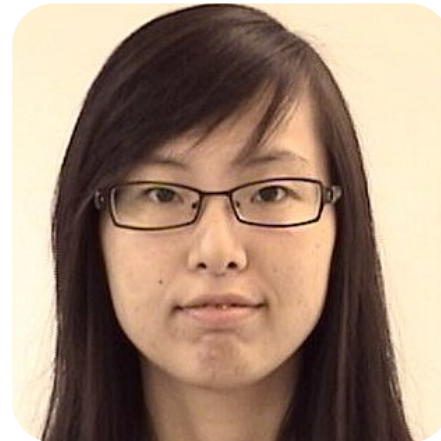
Publications

Feifei Niu



PhD, 2004, Landau Institute

[e-mail](#)



MS, 2013, MIT

[e-mail](#)

## Selected Projects



[Inner approximations of power flow feasibility sets](#) (2014-2017)

[Robust stability assessment in presence of load model uncertainty](#) (2014-2016)

[N-2 contingencies selection](#) (2012-2016)



## Stability and Security of large-scale Power systems

[Special protection and remedial action systems](#) (2015-2017)

[Transient stability and contraction of DAE system models](#) (2016-2017)

[Lyapunov function family approach for transient stability analysis](#) (2014-2017)

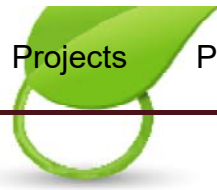
## Microgrids and distributed generation

[Stability of droop-controlled multi-microgrid](#)

Group

Projects

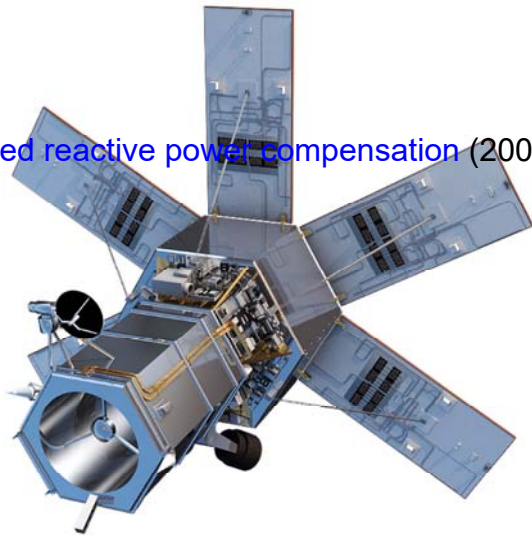
Publications



Ad hoc dc microgrids for developing world (2015-2017)

Real-time PMU data reversal analytics (2012-2016)

Distributed reactive power compensation (2009-2012)



Diagnostics of mechanism and source of sustained oscillations (2015-2017)

Bayesian PMU-based power plant parameter estimation (2015-2017)

Ambient fluctuations analysis for security assessment (2013-2017)

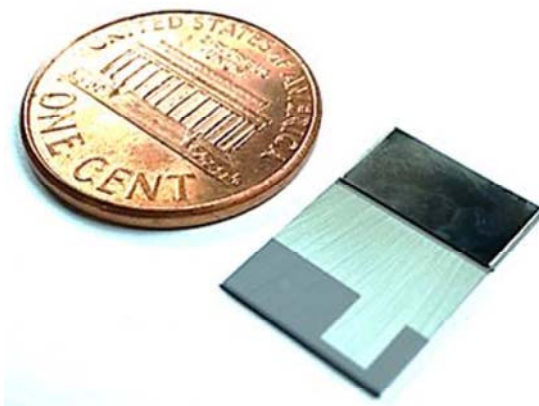
## Vibration energy harvesting

Harvesting from structural instabilities (2016-2017)

Harvester optimization under uncertainty (2016)

Nonlinear harvesting strategies (2015-2017)

Fundamental limits to vibrational energy harvesting efficiency (2014-2015)



## Optical Communications

Shannon capacity of nonlinear channels (2004, 2012)

All-optical polarization control (2011-2013)

Skewed coding for suppression of pattern-



[Group](#)[Projects](#)[Publications](#)

## Fluid dynamics



[particles](#) (2006-2008)

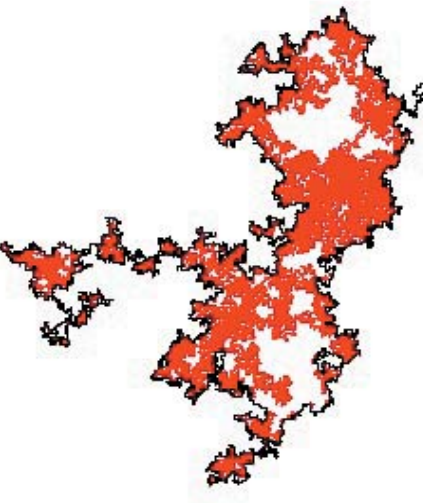
[Convective instabilities accelerating carbon sequestration](#) (2010-2011)

[Bubble pinch-off breakup process](#) (2008-2009)

[Dynamics of vesicles in flows](#) (2005-2008)

[Dynamics of flexible polymer molecules in flows](#) (2005-2007)

[Turbulent clustering of inertial](#)



## Statistical Mechanics

[Single Particle Tracking](#) (2010-2012)

[Irreversible Markov Chain Monte-Carlo](#) (2008-2011)

[Statistics of entropy production](#) (2006-2007)

## Publications

### Submitted / Under Review

H. D. Nguyen, K. Dvijotham, S. Yu, K. Turitsyn, [A Framework for Robust Steady-State Voltage Stability of Distribution Systems](#), IEEE Transactions on Smart Grid, submitted, also at arXiv:1705.05774 (2017) [\[PDF\]](#)

D. Lee, K. Turitsyn, [Dynamic Polytopic Template Approach to Robust Transient Stability Assessment](#), IEEE Transaction on Control of Network Systems, submitted, also at arXiv:1705.01189 (2017) [\[PDF\]](#)

T. L. Vu, H. D. Nguyen, A. Megretski, J. Slotine, K. Turitsyn, [Inverse Stability Problem and Applications to Renewables Integration](#), IEEE Control Systems

---

Letters, submitted, also at arXiv:1703.04491 (2017) [\[PDF\]](#)

H. D. Nguyen, T. L. Vu, J. Slotine, K. Turitsyn, [Contraction Analysis of Nonlinear DAE Systems](#), IEEE Transactions on Automatic Control, 1st revision, also at arXiv:1702.07421 (2017) [\[PDF\]](#)

K. Cavanagh, J. A. Belk, K. Turitsyn, [Transient stability guarantees for ad hoc dc microgrids](#), IEEE Control Systems Letters, submitted, also at arXiv:1707.01525 (2017) [\[PDF\]](#)

T. Bogodorova, L. Vanfretti, V. Peric, K. Turitsyn, [Identifying Uncertainty Distributions and Confidence Regions of Power Plant Parameters](#), IEEE Access, submitted (2017) [\[PDF\]](#)

## 2017

X. Wang, J. Bialek, K. Turitsyn, [PMU-Based Estimation of Dynamic State Jacobian Matrix and Dynamic System State Matrix in Ambient Conditions](#), IEEE Transactions on Power Systems PP, 1--1 (2017) [\[PDF\]](#)

T. L. Vu, S. Chatzivasileiadis, H. Chiang, K. Turitsyn, [Structural Emergency Control Paradigm](#), IEEE Journal on Emerging and Selected Topics in Circuits and Systems PP, 1--12 (2017) [\[PDF\]](#)

T. L. Vu, K. Turitsyn, [A Framework for Robust Assessment of Power Grid Stability and Resiliency](#), IEEE Transactions on Automatic Control 62, 1165--1177 (2017) [\[PDF\]](#)

A. Haji Hosseinloo, K. Turitsyn, [Energy harvesting via wrinkling instabilities](#), Applied Physics Letters 110, 013901 (2017) [\[PDF\]](#)

P. Vorobev, P. Huang, M. Al Hosani, J. L. Kirtley, K. Turitsyn, [High-Fidelity Model Order Reduction for Microgrids Stability Assessment](#), IEEE Transactions on Power Systems PP, 1--1 (2017) [\[PDF\]](#)

K. Dvijotham, H. Nguyen, K. Turitsyn, [Solvability regions of affinely parameterized quadratic equations](#), IEEE Control Systems Letters PP, 1--1 (2017) [\[PDF\]](#)

A. Haji Hosseinloo, J. Slotine, K. Turitsyn, [Robust and adaptive control of](#)  
 Group Projects Publications

[coexisting attractors in nonlinear vibratory energy harvesters](#), Journal of Vibration  


---

 and Control 9799, 107754631668899 (2017) [\[PDF\]](#)

D. Lee, K. Turitsyn, [Robust Transient Stability Assessment via Reachability  
 Analysis](#), 2017 X Bulk Power Systems Dynamics and Control Symposium IREP  
 (2017) [\[PDF\]](#)

X. Wang, K. Turitsyn, [PMU-Based Estimation of Dynamic State Jacobian Matrix](#),  
 IEEE International Symposium on Circuits Systems (2017) [\[PDF\]](#)

P. Vorobev, P. Huang, M. Al Hosani, J. L. Kirtley, K. Turitsyn, [A framework for  
 development of universal rules for microgrids stability and control](#), 2017 IEEE  
 Conference on Decision and Control (CDC) (2017) [\[PDF\]](#)

A. Haji Hosseinloo, K. Turitsyn, [Effective kinetic energy harvesting via structural  
 instabilities](#), SPIE Smart Structures and Materials + Nondestructive Evaluation and  
 Health Monitoring (2017) [\[PDF\]](#)

P. Huang, P. Vorobev, M. Al Hosani, J. L. Kirtley, K. Turitsyn, [Systematic Design of  
 Virtual Component Method for Inverter-Based Microgrids](#), Power Energy  
 Society General Meeting (2017) [\[PDF\]](#)

T. L. Vu, S. Chatzivasileiadis, H. Chiang, K. Turitsyn, [Structural emergency control  
 for power grids](#), 2017 American Control Conference (ACC) (2017) [\[PDF\]](#)

## 2016

T. L. Vu, S. M. Al Araifi, M. S. El Moursi, K. Turitsyn, [Toward Simulation-Free  
 Estimation of Critical Clearing Time](#), IEEE Transactions on Power Systems 31,  
 4722--4731 (2016) [\[PDF\]](#)

X. Wang, K. Turitsyn, [Data-Driven Diagnostics of Mechanism and Source of  
 Sustained Oscillations](#), IEEE Transactions on Power Systems 31, 4036--4046  
 (2016) [\[PDF\]](#)

T. L. Vu, K. Turitsyn, [Lyapunov Functions Family Approach to Transient Stability  
 Assessment](#), IEEE Transactions on Power Systems 31, 1269--1277 (2016) [\[PDF\]](#)

P. Kaplunovich, K. Turitsyn, [Fast and Reliable Screening of N-2 Contingencies](#),  
 IEEE Transactions on Power Systems 31, 4243--4252 (2016) [\[PDF\]](#)



H. D. Nguyen, K. Turitsyn, [Robust Stability Assessment in the Presence of Load Dynamics Uncertainty](#), IEEE Transactions on Power Systems 31, 1579--1594

---

(2016) [\[PDF\]](#)

H. D. Nguyen, D. Mehta, K. Turitsyn, [Numerical polynomial homotopy continuation method to locate all the power flow solutions](#), IET Generation, Transmission & Distribution 10, 2972--2980 (2016) [\[PDF\]](#)

A. H. Hosseinloo, K. Turitsyn, [Design of vibratory energy harvesters under stochastic parametric uncertainty: a new optimization philosophy](#), Smart Materials and Structures 25, 055023 (2016) [\[PDF\]](#)

A. Zlotnik, M. Chertkov, K. Turitsyn, [Assessing Risk of Gas Shortage in Coupled Gas-Electricity Infrastructures](#), 2016 49th Hawaii International Conference on System Sciences (HICSS) (2016) [\[PDF\]](#)

J. A. Belk, W. Inam, D. J. Perreault, K. Turitsyn, [Stability and control of ad hoc dc microgrids](#), 2016 IEEE 55th Conference on Decision and Control (CDC) (2016) [\[PDF\]](#)

D. Mehta, D. K. Molzahn, K. Turitsyn, [Recent advances in computational methods for the power flow equations](#), 2016 American Control Conference (ACC) (2016) [\[PDF\]](#)

W. Inam, J. A. Belk, K. Turitsyn, D. J. Perreault, [Stability, control, and power flow in ad hoc DC microgrids](#), 2016 IEEE 17th Workshop on Control and Modeling for Power Electronics (COMPEL) (2016) [\[PDF\]](#)

T. Bogodorova, L. Vanfretti, K. Turitsyn, [Voltage control-based ancillary service using thermostatically controlled loads](#), 2016 IEEE Power and Energy Society General Meeting (PESGM) (2016) [\[PDF\]](#)

M. Parandehgheibi, K. Turitsyn, E. Modiano, [Distributed frequency control in power grids under limited communication](#), 2016 IEEE 55th Conference on Decision and Control (CDC) (2016) [\[PDF\]](#)

T. L. Vu, K. Turitsyn, [Robust transient stability assessment of renewable power grids](#), 2016 IEEE International Conference on Sustainable Energy Technologies (ICSET) (2016) [\[PDF\]](#)