

2024 AFOSR Dynamical Systems and Control Theory Review

Dr. Fred Leve | August 26-30, 2024 | Arlington, VA

Basic Research Innovation Collaboration Center (BRICC)
4100 N Fairfax Drive, Suite 450 | Arlington, VA 22203

Agenda Day 1 | Monday, August 26, 2024

Time	Topic	Speaker
08:00-08:30	Check-in/Log-in	
08:30-08:40	Status Update	Frederick Leve, AFOSR
08:40-09:10	Variational closures for composite homogenized fluid flows	Ruiao Hu, Imperial College London
09:10-09:40	A Topological Approach for Detecting P-Bifurcations from Kernel Density Estimates	Firas Khasawneh and Elizabeth Munch, Michigan State U
09:40-10:10	Differential games relevant to the warfighter	Meir Pachter, AFIT
10:10-11:00	BREAK	
11:00-11:30	Fixed Time Stability, Uniform Strong Dissipativity, and Stability of Nonlinear Feedback Systems	Wassim Haddad, GaTech
11:30-12:00	Stability Margins of Neural Network Controllers	Murat Arcak, UC Berkeley
12:00-12:30	System Theoretic Dissipativity for Nash Equilibria Learning In Large Agent Populations	Nuno Martins, UMD
12:30-2:30	LUNCH	
2:30-3:00	Mean Field Games on Sparse and Dense Networks	Peter Caines, McGill U
3:00-3:30	Dynamic Mission Planning: Adversarial Conflicts and Optimal Dubins Path on a Sphere	Eloy Garcia, AFRL/RQ
3:00-4:00	Opportunistic Stochasticity in Shortest Path Problems: from causal PDE-discretizations to efficient routing of autonomous vehicles	Alexander Vladimirsky, Cornell
4:00-4:30	New homotopy-based obstructions to global dynamic feedback stabilization	Mohamed Belabbas, UIUC
4:30-5:00	Discussion	
5:00	MEETING ADJOURN	

Agenda Day 2 Tuesday, August 27, 2024		
Time	Topic	Speaker
08:00-08:30	Check-in/Log-in	
08:30-08:40	Morning Welcome and Discussions	Frederick Leve, AFOSR
08:40-09:10	Certifying and training reachable sets for neural network-controlled systems	Coogan, Sam GaTech
09:10-09:40	Some topics at the intersection of control, dynamics, and learning from data	Sontag, Eduardo Northeastern U
09:40-10:10	Mechanism Design for Control-theoretic Objectives	Vijay Gupta, Purdue
10:10-11:00	BREAK	
11:00-11:30	Biologically Plausible Optimization: Competitive Neural Circuits & Contraction Theory	Francesco Bullo, UCSB
11:30-12:00	Safe and Constrained Feedback Optimization of Dynamical Systems	Emiliano D'allanese, UCSD and Boston U
12:00-12:30	Non-convexity analysis: Online optimization and online learning	Javad Lavaei, UC Berkeley
12:30-2:30	LUNCH	
2:30-3:00	Learning-Based Planning & Control with Persistent Safety for UAS	Naira Hovakimyan, UIUC
3:00-3:30	Developments in Suboptimal Model Predictive and Constrained Control	Ilya Kolmanvsky, U Mich
3:00-4:00	A new operator for dynamic mode decomposition in discrete time	Rushi Kamalapurkar, and Joel Rosenfeld, USF and U Florida
4:00-4:30	A New Operator for Learning Nonlinear Dynamics	Joel Rosenfeld, USF
4:30-5:00	Discussion	
5:00	MEETING ADJOURN	

Agenda Day 3 Wednesday, August 28, 2024		
Time	Topic	Speaker
08:00-08:30	Check-in/Log-in	
08:30-08:40	Morning Welcome and Discussions	Frederick Leve, AFOSR

08:40-09:10	Backward Map for Filter Stability Analysis	Prashant Mehta, UIUC
09:10-09:40	Advanced Tools for Verification of Learning-based Control	Hu Bin, UIUC and U Mich
09:40-10:10	Information-Geometric Path Planning: Roles of Information Theory in Motion Planning and Future Research Opportunities	Tanaka Takashi, UT Austin
10:10-11:00	BREAK	
11:00-11:30	Convexification of Motion Planning and Control through Liftings and Hypercomplex Numbers	Mehran Mesbahi, U of Washington
11:30-12:00	The sub-Riemannian geometry of Optimal Mass Transport	Tryphon Georgiou, UC Irvine
12:00-12:30	Data-guided Learning and Control of Higher Order Structures	Indika Rajapakse, et al, U Mich and Raytheon
12:30-2:30	LUNCH	
2:30-3:00	Distributional Control of Ensemble Systems	Jrshin Li, Wash U
3:00-3:30	Feedback Stabilization of Ensemble Systems	Xudong Chen, Wash U
3:00-4:00	A Compositional Framework for Non-convex Decision Problems	Matthew Hale, Gatech
4:00-4:30	Glimmers of autonomy: Structure-aware reachability analysis and control synthesis for unknown nonlinear systems	Melkior Ornik, UIUC
4:30-5:00	Discussion	
5:00	MEETING ADJOURN	

Agenda Day 4 Thursday, August 29, 2024		
Time	Topic	Speaker
08:00-08:30	Check-in/Log-in	
08:30-08:40	Morning Welcome and Discussions	Frederick Leve, AFOSR
08:40-09:10	Active Learning for Control-Oriented Identification of Nonlinear Systems	Nikola Matni, U Penn
09:10-09:40	Structure and dynamics of working language	David Spivak, Topos Institute

09:40-10:10	Geometric Adjoint Sensitivity Analysis for Lie Groups and PDEs	Melvin Leok, UCSD and UT Austin
10:10-11:00	BREAK	
11:00-11:30	Effective Whitney Stratification of Algebraic Maps and Applications	Helmer, Martin and Nanda, Vedit NCSU and Oxford
11:30-12:00	Mathematically Justified Computational Platform for Nonlinear Dynamics	Konstantin Mishaikow, and William Kalies, Rutgers and Utoledo
12:00-12:30	Understanding and Leveraging Synchronization in Reservoir Computing	Adrian Wong, AFRL/RQ
12:30-2:30	LUNCH	
2:30-3:00	Hybrid Geometric Control and Morse Theory	Ricardo Sanfelice, UCSC
3:00-3:30	Converse theorems for strong forward invariance with applications to interconnections	Andy Teel, UCSB
3:00-4:00	Hybrid Lie-Bracket Averaging for Model-Free Optimization and Control	Jorge Poveda, UCSD
4:00-4:30	Topological Methods for Assured Transitions in Hybrid Systems	Daniel Guralnik, and Warren Dixon, UF
4:30-5:00	Discussion	
5:00	MEETING ADJOURN	

Agenda Day 5 Friday, August 30, 2024		
Time	Topic	Speaker
08:00-08:30	Check-in/Log-in	
08:30-08:40	Morning Welcome and Discussions	Frederick Leve, AFOSR
08:40-09:10	Real-time optimal distributed estimation and control of spatiotemporal processes using multi-domain methods and optimally-guided mobile sensors	Michael Demetriou, WPI
09:10-09:40	MPC based Feedback Control of Flow-Transport Systems: Analysis, Computation, and Machine Learning	Wei Wei Hu, U Georgia
09:40-10:10	Dynamic shape state space modeling with change points	Chiwoo Park, U Washington
10:10-11:00	BREAK	

11:00-11:30	Offline Learning of Gain Maps Enables Online-Adaptive PDE Control	Miroslav Krstic, UCSD
11:30-12:00	Boundary Stabilization of a Bending and Twisting Beam	Krener, Art UC Davis
12:00-12:30	Stat-duality, HJ PDEs with low-dimensional nonlinearities and the Schrödinger equation	William McEneaney, UCSD
12:30-2:30	LUNCH	
2:30-3:00	Obstructions to feedback stabilization	Matthew Kvalheim, UMBC
3:00-3:30	Robust Optimal Estimation and Control for Dynamic Systems with Additive Heavy-Tailed Uncertainty for Aerospace Applications	Jason Speyer, UCLA
3:00-4:00	Uncertainty-Aware Guidance for Multi-Agent Target Tracking subject to Intermittent Measurements using Motion Model Learning	Zachary Bell, AFRL/RW
4:00-4:30	Rigorous Optimal Uncertainty Quantification & Optimization	Adam Gerlach, AFRL/RQ
4:30-5:00	Discussion	
5:00	MEETING ADJOURN	