

2023 AFOSR Dynamical Systems and Control Theory Review

Dr. Fred Leve | September 11-15, 2023 | Arlington, VA -hybrid

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

Agenda Day 1 | September 11, 2023

Time	Topic	Speaker
8:00-8:30	In-person check-in / Virtual log-in	
8:30-8:40	Status Update	Frederick Leve, AFOSR
8:40-9:10	Fluids on geometric rough paths	James Michael Leahy, Imperial College London
9:10-9:40	Formalizing an optimization problem for inferring the entropy production from observed statistics	Gili Bisker, Tel Aviv University
9:40-10:10	Optimal Control of a Notional Hypersonic Missile	Meir Pachter, AFIT
10:10-10:30	BREAK	
10:30-11:00	Stochastic Thermodynamics: From Dissipativity to Accumulativity and Energy Storage to Entropy Production	Wassim Haddad, GaTech
11:00-11:30	Stochastic Systems with non-Gaussian Noise	Tyrone Duncan and Bozenna Pasik-Duncan, KU
11:30-12:00	Population Games and Evolutionary Dynamics: Towards a More Realistic Theory	Nuno Martins, Umaryland
12:00-1:30	LUNCH (Outside BRICC)	
1:30-2:00	Ensemble PDE Control	Miroslav Krstic, UCSD
2:00-2:30	Two-phase Differential Games and Cooperative Engagements in the Beyond Visual Range Domain	Eloy Garcia, AFRL/RQ
2:30-3:00	Advances in Contraction Theory for Neural Networks and Convex Optimization	Francesco Bullo, UCSB
3:00-3:20	BREAK	
3:20-3:50	Collaborative Coalitions in Multi-Agent Systems	Jason Marden, UCSB
3:50-4:20	Utilizing control-oriented properties in learning	Vijay Gupta, Notre Dame
4:20-4:50	Persistence of Graphs: Time-dependence and Directionality	Firas Khasawneh and Elizabeth Munch, Michigan State U
4:50-5:00	Review Adjourn	

Agenda Day 2 | September 12, 2023

Time	Topic	Speaker
8:00-8:30	In-person check-in / Virtual log-in	
8:30-8:40	Morning Welcome and Discussions	Frederick Leve, AFOSR
8:40-9:10	Critical Nash Values for Graphon Mean Field Games	Peter Caines, McGill U
9:10-9:40	Flow-dependent Lyapunov functions and contraction analysis	Eduardo Sontag, Northeastern U
9:40-10:10	Global Minimization of Analytic Functions through Polynomial Approximations	Georgy Scholten, U Sorbonne
10:10-10:30	BREAK	
10:30-11:00	Boundary Arc and Boundary Point Stabilization of the Heat Equation on the Unit Disk via LQR	Art Krener, UC Davis
11:00-11:30	Direct Adaptive Control of Nonlinear Systems with Uncertain Unstable Zero Dynamics	Dennis Bernstein, Umich
11:30-12:00	Learning of Dynamical Systems with More Corrupt Data than Clean Data using Nonlinear Optimization	Javad Lavaei, UC Berkeley
12:00-1:30	LUNCH (Outside BRICC)	
1:30-2:00	Learning-Based Planning & Control with Persistent Safety for UA	Naira Hovakimyan, UIUC
2:00-2:30	Developments in Suboptimal Model Predictive and Constrained Control	Ilya Kolmanovsky, U Mich
2:30-3:00	An Interaction-aware, Monotone Systems approach to Reachability of Neural Feedback Loops	Sam Coogan, GaTech
3:00-3:20	BREAK	
3:20-3:50	Stat-duality based method for Rapid Solution of High-dimensional First-order HJ PDE Problems with Low-dimensional Nonlinearities	William McEneaney, UCSD
3:50-4:20	New Results on Convergent Spectral Decomposition of Dynamic Systems	Rushi Kamalapurkar, USF and Joel Rosenfeld, Uoklahoma
4:20-4:50	Operator Decompositions for Inverse Problems	Joel Rosenfeld, USF
4:50-5:00	Review Adjourn	

Agenda Day 3 | September 13, 2023

Time	Topic	Speaker
8:00-8:30	In-person check-in / Virtual log-in	
8:30-8:40	Morning Welcome and Discussions	Frederick Leve, AFOSR
8:40-9:10	Duality theory for nonlinear filtering	Prashant Mehta, UIUC
9:10-9:40	Model-Based Machine Learning Methods for Optimal Feedback Control	Qi Gong, UCSC
9:40-10:10	Simultaneous perception-action design for minimum sensing navigation	Tanaka Takashi, UT Austin
10:10-10:30	BREAK	
10:30-11:00	Convexification of Motion Planning and Control through Liftings and Hypercomplex Numbers	Mehran Mesbahi, U of Washington
11:00-11:30	Design of robust and accurate biosensing systems	Domitilla Del Vecchio, MIT
11:30-12:00	Data-guided Learning and Control of Higher Order Structures	Indika Rajapakse et al, U Mich and UTRC
12:00-1:30	LUNCH (Outside BRICC)	
1:30-2:00	Distributed asynchronous non-convex optimization: Fundamental limits of convergence rates	Jrshin Li, Wash U
2:00-2:30	Resilience and guaranteed task completion for partially unknown nonlinear control systems	Xudong Chen, CU Boulder
2:30-3:00	Dynamical Theory on Efficacy of Reservoir Computing	Allen Tannenbaum, Stonybrook U
3:00-3:20	BREAK	
3:20-3:50	Distributed asynchronous non-convex optimization: Fundamental limits of convergence rates	Matthew Hale, UF
3:50-4:20	Resilience and guaranteed task completion for partially unknown nonlinear control systems	Melkior Ornik, UIUC
4:20-4:50	Dynamical Theory on Efficacy of Reservoir Computing	Adrian Wong, AFRL/RQ
4:50-5:00	Review Adjourn	

Agenda Day 4 | September 14, 2023

Time	Topic	Speaker
8:00-8:30	In-person check-in / Virtual log-in	
8:30-8:40	Morning Welcome and Discussions	Frederick Leve, AFOSR
8:40-9:10	Topology in Optimization, Global Stabilization and System Equivalence	Mohamed Belabbas, UIUC
9:10-9:40	Dynamic Operads	David Spivak, Topos Institute
9:40-10:00	BREAK	
10:00-10:30	Effective Whitney Stratification of Real Algebraic Varieties	Martin Helmer, NCSU and Vedit Nanda, Oxford
10:30-11:00	Mathematically Justified Computational Platform for Nonlinear Dynamics	Konstantin Mishaikow, Rutgers and William Kalies, Utoledo
11:00-1:00	LUNCH (Outside BRICC) End of Regular Review	
Beginning of Open Hybrid Dynamical Systems		
1:00-1:30	Uncertainty-Aware Guidance for Target Tracking subject to Intermittent Measurements using Motion Model Learning	Zachary Bell, AFRL/RW
1:30-2:00	The Geometry of Hybrid Dynamical Systems: From Intrinsic Properties to Robust Hybrid Geometric Control	Richard Sanfelice, UCSC
2:00-2:30	Multi-channel Time Domains and Clustering Protocols for Large-scale Interconnections of Hybrid Systems	Andy Teel, UCSB
2:30-3:00	Averaging Tools for a Class of Stochastic Hybrid Dynamical Systems with Multi-Time Scale Flows	Jorge Poveda, UCSD
3:00-3:20	BREAK	
3:20-3:50	Probabilistic Invariance and Data-Driven Reachability for Gaussian Process State Space Models	Murat Arcak, UC Berkeley
3:50-4:20	Piecewise-deterministic Markov Processes: Abrupt Context changes and Structured Uncertainty	Alexander Vladimirovsky, Cornell
4:20-4:50	Topological Methods for Assured Transitions in Hybrid Systems	Warren Dixon and Dan Guralnik, UFL
4:50-5:00	Review Adjourn	

Agenda Day 5 | September 15, 2023

Second Day of Open Hybrid Dynamical Systems (MURI Teams)

Time	Topic	Speaker
8:00-8:30	In-person check-in / Virtual log-in	
8:30-8:40	Morning Welcome and Discussions	Frederick Leve, AFOSR
8:40-9:10	Hybrid Dynamics - Deconstruction and Aggregation: An Overview of the Project	Yuliy Barishnikov, UIUC
9:10-9:40	On Invariants, Composition, and Networks of Hybrid Systems	Paolo Tabuada, UCLA
9:40-10:10	Toward a Toolbox (and its Use) for Systems ID of Nonlinear Hybrid Dynamical Systems from Data	Dan Koditschek, Upenn
10:10-10:30	BREAK	
10:30-11:00	A Topological view of Design for Multi-Agent Hybrid Systems	Sayan Mitra, UIUC
11:00-11:30	A Categorical Perspective on Lyapunov	Aaron Ames, Caltech
11:30-12:00	Hybrid Dynamical Systems with Slow and Fast Time-variation and Mode Switching	Daniel Liberzon, UIUC
12:00-1:30	LUNCH (Outside BRICC)	
Beginning of Open Hybrid Dynamical Systems		
1:30-2:00	Unified Framework for Invariance and Composition of Open Hybrid Dynamical Systems	Taeyoung Lee, GWU
2:00-2:30	Geometry, Topology, and Symmetry of Open Smooth and Hybrid Systems	Anthony Bloch, U Mich and William Clark, Ohio University
2:30-3:00	Interaction Networks, Homological Dynamics, and Control	William Kalies, Univ of Toledo and Konstantin Mischaikow, Rutgers
3:00-3:20	BREAK	
3:20-3:50	Modeling, Control, and Trajectory Optimization by Exploiting Lie Group Symmetry	Maani Ghaffari, U Mich
3:50-4:20	Real-Time Verification of High-Dimensional Systems via Composition of Reachable Sets	Ram Vasudevan, U Mich
4:20-4:50	Compositional Reactive Planning for Complex Tasks using Topological Invariants of Strategy Spaces	Dan Guralnik, UFL
4:50-5:00	Review Adjourn	