



2nd Annual Meeting of the AFRL Mathematical Modeling and Optimization Institute

FINAL PROGRAM

University of Florida
Research Engineering and Education Facility
Shalimar, FL
July 28 – July 31, 2014

This meeting is sponsored by the Department of Industrial and Systems Engineering
and the Defense-Oriented Operations Research Lab at the University of Florida



Meeting Information

Registration

Registration is free and all meeting attendees **must register**. Registration material can be picked up on Monday-Thursday 8:00-8:30 in the UF-REEF lobby.

Coffee Breaks

Coffee breaks will be held 9:30-9:45, 1:30-1:45, and 3:15-3:30 on Monday-Thursday in the UF-REEF lobby.

Lunch Break

Lunch breaks will be 11:15-12:30 on Monday-Thursday.

Internet Access

Internet access is available free of charge.
Network SSID: ufvisitor

Meeting Rooms

UF-REEF Auditorium
UF-REEF Studio 110

Whenever there are parallel sessions the session marked with 1 (e.g., Session E-1) is organized in the UF-REEF Auditorium, while the one marked with number 2 (e.g., Session E-2) is organized in the UF-REEF Studio 110.

Monday, July 28th

8:25-9:30 Session A

UF-REEF Auditorium

Opening remarks by Vladimir Boginski

PLENARY TALK

Munitions Directorate Overview

Mikel Miller, ST, Chief Scientist, AFRL/RW

9:30-9:45 Coffee Break

9:45-11:15 Session B-1

UF-REEF Auditorium

Critical Nodes for Communication Efficiency and Related Problems in Graphs

Oleg Prokopyev, University of Pittsburgh

New Integer Programming Based Approaches for Finding Maximum Quasi-Cliques and Dense Subgraphs

Alexander Veremyev, AFRL Munitions Directorate

9:45-11:15 Session B-2

UF-REEF Studio 110

Casting Visual Search Problems as Optimization Problems to Solve in Real Time

Nicholas Gans, University of Texas at Dallas

Information Fusion in Human-Robot Collaboration using Neural Network Representation

Ashwin Dani, University of Connecticut

Simultaneous Target Estimation and Path Planning in Urban Environments

Michael McCourt, University of Florida

11:15-12:30 Lunch Break

12:30-1:30 Session C

UF-REEF Auditorium

Computational Challenges in Assured Distributed Seeker-Sensor Fusion

Piyush Kumar, CompGeom Inc.

1:30-1:45 Coffee Break

1:45-3:15 Session D-1

UF-REEF Auditorium

A stochastic PDE-constrained optimization approach to active control of multifunctional composite structures

Pavlo Krokhmal, University of Iowa

Accelerated methods for large-scale compressive sensing and machine learning problem

Yuyuan Ouyang, University of Florida

1:45-3:15 Session D-2

UF-REEF Studio 110

A Switched Systems Approach to Vision-Based Localization of a Target with Intermittent Measurements

Anup Parikh, University of Florida

Target Search and Acquisition by UAVs and Unattended Ground Sensors in Urban Environments

Pablo Ramirez, University of Texas at Dallas

Decentralized Event-Triggered Based Containment Control for a Network System

Teng-Hu Cheng, University of Florida

3:15-3:30 Coffee Break

3:30-5:00 Session E-1

UF-REEF Auditorium

An Integer Programming Framework for Detecting Sybil Nodes in Online Social Networks

Chrysafis Vogiatzis, University of Florida

Detecting Critical Vertex Structures on Graphs: A Mathematical Programming Approach

Jose L. Walteros, University of Florida

Sequential network interdiction with incomplete information

Juan Borrero, University of Pittsburgh

3:30-5:00 Session E-2

UF-REEF Studio 110

Design of a guidance controller using network topology

Clay Robertson, Auburn University

Frontier Based Exploration with the use of Navigation Function

Carlos Caballero, University of Florida

Rough-Map Merging by Clustering Obstacles

Jinyoung Park, Auburn University

Path Planning for Multiple Observer, Multiple Target Vision-Based Tracking Applications with Loss-of-Sight Considerations

Ryan Licitra, University of Florida

Tuesday, July 29th

8:30-9:30 Session A
UF-REEF Auditorium

PLENARY TALK

Embedded Feature Selection for High Dimensional Data Sets

Panos M. Pardalos, Distinguished Professor, Industrial and Systems Engineering, University of Florida

9:30-9:45 Coffee Break

9:45-11:15 Session B-1
UF-REEF Auditorium

GPOPS-II: A MATLAB Software for Solving Multiple-Phase Optimal Control Problems Using hp-Adaptive Gaussian Quadrature Collocation Methods and Sparse Nonlinear Programming

Michael Patterson, University of Florida

Source Transformation via Operator Overloading for Automatic Differentiation in MATLAB

Anil Rao, University of Florida

A dual weighted Residual error estimation scheme for mesh refinement

Murat Engin Unal, University of Florida

9:45-11:15 Session B-2
UF-REEF Studio 110

High performance algorithm design for sensor fusion and target tracking on a smart grid of munitions

Alla Kammerdiner, New Mexico State University

Simultaneous Geometry and Weight Optimization for Electronically Scanned Wideband Planar Arrays

Serdar Karademir, University of Florida

Minimum Risk Network Coverage Problems

Konstantin Pavlikov, University of Florida

11:15-12:30 Lunch Break

12:30-1:30 Session C

UF-REEF Auditorium

Error Estimation in Nonlinear Optimization and Dual Active Set Constraints

William Hager, University of Florida

A semi-analytical split-Bernstein approach to chance constrained programs

Mrinal Kumar, University of Florida

1:30-1:45 Coffee Break

1:45-3:15 Session D-1

UF-REEF Auditorium

A Graph Coarsening Method for KKT Systems Arising in Orthogonal Collocation of Optimal Control Problems

Begum Senses, University of Florida

Minimum-Time Trajectory Optimization of Many Revolution Low-Thrust Earth-Orbit Transfers

Kathryn Graham, University of Florida

Control Approximation for Switching Structure Identification in Gauss Collocation Methods

Joseph Eide, University of Florida

Adaptive Mesh Refinement Method for Optimal Control Using Nonsmoothness Detection and Mesh Size Reduction

Fengjin Liu, University of Florida

1:45-3:15 Session D-2

UF-REEF Studio 110

Adaptive BOSVS Algorithm for Ill-Conditioned Linear Inversion with Applications to Partially Parallel Imaging

Maryam Yashtini, University of Florida

An Accelerated Bregman Operator Splitting-Type Algorithm with Applications to Partially Parallel Imaging

Xianqi Li, University of Florida

Fast bundle-level method for multi-task learning

Wei Zhang, University of Florida

Multi-Channel Image Reconstruction

Hao Zhang, University of Florida

3:15-3:30 Coffee Break

3:30-5:00 Session E-1

UF-REEF Auditorium

Rendezvous with Scalar Control for Nonholonomic Robots

Chau Ton, NRC Postdoc

Fractional-order System based Human-Robot Network for Rendezvous Problems with Common Scalar Control

Zhen Kan, University of Florida

An Attacker-Defender Game and A Cooperative Estimation Scheme

Neha Satak, University of Florida

3:30-5:00 Session E-2

UF-REEF Studio 110

The Stochastic Incremental Network Design Problem with Shortest Paths and Uncertain Build Times

Nathaniel Richmond, University of Iowa

Jammer Placement to Partition Wireless Network

Jixin Feng, University of Florida

New analytical lower bounds for the maximum clique number of graphs

Vladimir Stozhkov, University of Florida

Wednesday, July 30th

8:30-9:30 Session A UF-REEF Auditorium

PLENARY TALK

Modeling and Analysis of Fluid-Thermal-Structural Interactions in Hypersonic Flow

Jack McNamara, Associate Professor, Mechanical and Aerospace Engineering, The Ohio State University

9:30-9:45 Coffee Break

9:45-11:15 Session B-1 UF-REEF Auditorium

Towards Aerothermoelastic Tailoring of Waveriders

Narayanan Komerath, Georgia Institute of Technology

The Discontinuous Galerkin Method as a Mainstream Approach for Computational Fluid Dynamics

Andrew Shelton, Leidos

Reactive Burn Model Parameterization Incorporating Ignition and Sustained Pulse Data Sets

Robert Dorgan, AFRL/RWWC

9:45-11:15 Session B-2 UF-REEF Studio 110

Approaches for Aggregating Information From Conflicting Sources

Tathagata Mukherjee, Florida State University

Belief Propagation Algorithm for Near-optimal Graph Matching in Formation Reconfiguration Problems

Xin Li, University of Florida

Distances Between Multidimensional Distributions for Image Classification

Aleksandr Mafusalov, University of Florida

Support Vector Machines with Risk Constraints

Victoria Zdanovskaya, University of Florida

11:15-12:30 Lunch Break

12:30-1:30 Session C

UF-REEF Auditorium

Experimental Characterization and modeling of plastic deformation in Titanium

Oana Cazacu, University of Florida

Sensing and Imaging of Impact Damage in Composites

Olesya Zhupanska, University of Iowa

1:30-1:45 Coffee Break

1:45-3:15 Session D-1

UF-REEF Auditorium

New three-dimensional strain-rate potential for porous metals with faceted yield surface

Benoit Revil-Baudard, University of Florida

Calculation of thermal properties of silicon carbide from the first principles using density functional perturbation theory of phonons

Anna Kuznetsova, Air Force Research Laboratory

Modeling of the effective thermo-mechanical properties of Aluminum/Zirconia composite over a wide temperature range

Phillip Deierling, University of Iowa

A stochastic PDE-constrained optimization approach to vibration control of a composite plate subjected to mechanical and electromagnetic loads

Dmitry Chernikov, University of Iowa

1:45-3:15- Session D-2

UF-REEF Studio 110

Decentralized Riemannian Particle Filtering & Multiagent Navigation Without GPS

Martin Eilders, AFRL/RWWN

Integrated Control and Estimation

Adam Rutkowski, AFRL/RWWI

Bioinspired Magnetic Reception and Multimodal Sensing

Brian Taylor, AFRL/RWWI

3:15-3:30 Coffee Break

3:30-5:00 Session E-1

UF-REEF Auditorium

High Speed Fluid Structural Interactions and Reduced-order Modeling

Ryan Klock, AFRL/RW

Aerothermodynamic Modeling of Munitions on Terminal Hypersonic Trajectories: Grid Generation

Emily Dreyer, Embry-Riddle Aeronautical University

Aerothermodynamic Modeling of Munitions on Terminal Hypersonic Trajectories

Jake Larkin, The Ohio State University

Aeroelastic Simulation of Flexible High Speed Vehicles

Dianne Zettl, USRA

Aeroelastic Simulation of Flexible High Speed Vehicles

Ryan Kitson, University of Michigan

3:30-5:00 Session E-2

UF-REEF Studio 110

On solution approaches to a class of mixed-integer non-linear stochastic programming problems

Alexander Vinel, The University of Iowa

A Multistage and Multiscale Stochastic Programming Approach to Electricity Infrastructure Investment

Zhouchun Huang, University of Central Florida

Nonlinear Mixed Integer Programming Approaches for Generalized Geometric Programming

Yiduo Zhan, University of Central Florida

Thursday, July 31st

8:30-9:30 Session A
UF-REEF Auditorium

PLENARY TALK

Nonlinear Dynamics of Fluid and Structural Systems

Earl Dowell, William Holland Hall Professor of Mechanical Engineering in the Edmund T. Pratt, Jr. School of Engineering, Duke University

9:30-9:45 Coffee Break

9:45-11:15 Session B-1
UF-REEF Auditorium

Scale-reduction Techniques for Optimization Problems in Networks

Sergiy Butenko, Texas A&M

Node Interdiction in Coupled Interdependent Networks with Cascading Failures

Vladimir Boginski, University of Florida

9:45-11:15 Session B-2
UF-REEF Studio 110

Multi-Purpose Guidance

James R. Cloutier, AFRL/RWWN

Optimal Control

Quang Lam, AFRL/RWWN

11:15-12:30 Lunch Break

12:30-1:30 Session C-1
UF-REEF Auditorium

On connectivity constraints in integer programs

Austin Buchanan, Texas A&M University

Facets of Connected Subgraph Polytope via Lifting Procedure

Yiming Wang, Texas A&M University

12:30-1:30 Session C-2

UF-REEF Studio 110

Robust Adaptive Control in the Presence of Unmodeled Dynamics

Heather Hussain, MIT

Higher Order Sliding Mode Control of 6DOF Hypersonic Missile during Terminal Approach using an Adaptive Observer

Stephen Phillips, The University of Alabama in Huntsville

1:30-1:45 Coffee Break

1:45-3:15 Session D-1

UF-REEF Auditorium

AFRL Autonomous Lab Overview

Kevin Brink, AFRL/RWWI

A Robust Relative Estimation Framework for GPS-Denied Navigation

Daniel Koch, Brigham Young University

Comparison of Bayesian Search Algorithms

Drew Ellison, CU Boulder

Distributed Solutions to the Dynamic Weapon Target Assignment Problem

Kyle Volle, Georgia Institute of Technology

1:45-3:15 Session D-2

UF-REEF Studio 110

Control of Nonlinear Aerospace Systems using Micro-Jet Actuators

Siddhartha Mehta, University of Florida

Multi-Grid Analysis of High Order Synthetic Jet Actuators and LCO Simulations

Marco Sansone, ERAU

Store-Induced Limit Cycle Oscillations due to Nonlinear Wing-Store Attachment

Madhusudan Padmanabhan, Duke University

3:15-3:30 Coffee Break

3:30-5:00 Session E-1

UF-REEF Auditorium

Cooperative estimation for feature-based SLAM

Timothy Woodbury, Texas A&M University

Hardware and Capability Build for an Autonomous Relative Navigation Framework

Gary Ellingson, Brigham Young University

AFRL Autonomous Lab Demo

Kevin Brink, AFRL/RWWI

3:30-5:00 Session E-2

UF-REEF Studio 110

The Maximum s -Stable Cluster problem

Chitra Balasubramaniam, Texas A&M University

Heuristic approaches for detecting robust cliques in graphs subject to uncertain edge failures

Oleksandra Yezerka, Texas A&M University

On the Lagrangian duality of the maximum γ -quasi-clique problem

Zhuqi Miao, Oklahoma State University

Resilient Network Design via Spanning k -Cores

Juan Ma, Oklahoma State University