Efstathios Bakolas

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EDUCATION

Georgia Institute of Technology, Atlanta, GA, Ph.D., Aerospace Engineering, 2011

Georgia Institute of Technology, Atlanta, GA, MS., Aerospace Engineering, 2007

National Technical University of Athens, Athens, Greece, Diploma, Mechanical Engineering, 2004

EMPLOYMENT

Assistant Professor, Department of Aerospace Engineering and Engineering Mechanics, The University of Texas at Austin, 2012 – present

Post-Doctoral Fellow, School of Aerospace Engineering, Georgia Institute of Technology, February, 2012 – July, 2012

Research Assistant, School of Aerospace Engineering, Georgia Institute of Technology, 2005 – 2011

TEACHING

Individual Student Guidance

Current Graduate Students: (Starting Fall 2013)

1. Jhanani Selvakumar, Doctor of Philosophy, advised since August 2013
   Expected graduation date August 2018
2. Andrei Marchidan, Doctor of Philosophy, advised since August 2013
   Expected graduation date December 2018
3. Dimitrios Pylorof-Parsinas, Doctor of Philosophy, advised since August 2013
   Expected graduation date May 2019
4. Alaa Abdulghafoor, Doctor of Philosophy, advised since January 2018

Past Graduate Students, Doctoral: -

Past Graduate Students, MS:
1. Andrei Marchidan, 2015
2. Dimitrios Pylorof-Parsinas, 2015

Current Undergraduate Students:
1. Jorge Gutierrez (Summer 2017, Fall 2017)
2. Erik Ballesteros (Fall 2017)

Past Undergraduate Students:
1. Sterling Maynard (Fall 2015, Spring 2016)
2. Timothy Baba (Summer 2015)

Courses Taught

The University of Texas at Austin, Austin, Texas
Department of Aerospace Engineering and Engineering Mechanics

1. ASE 370L, Flight Control Systems, F12, F13.
2. ASE 381P.2, Multivariable Control Systems, S13, S14, S15.
3. ASE 330M, Linear Systems Analysis, S14, S15, S16, S17, S18.
4. ASE 381P.3, Optimal Control Theory, F14, F15, F16, F17.

PROFESSIONAL AFFILIATIONS

Institute of Electrical and Electronics Engineers (IEEE), *Member*
American Institute of Aeronautics and Astronautics (AIAA), *Senior Member*

SCHOLARLY ACCOMPLISHMENTS

Journal Publications

1. Pylorof, D. and Bakolas, E., "Safe nonlinear control design for input constrained polynomial systems using sum of squares programming," (Note: under review, submitted on February 2018), 2018.
2. Bakolas, E., Dynamic Output Feedback Control of the Liouville Equation for Discrete-Time SISO Linear Systems (Note: under review, submitted on January 2018), 2018.
3. Selvakumar, J. and Bakolas, E. "Robust time-optimal guidance in a partially uncertain time-varying flow-field," *Journal of Optimization Theory and Applications*, (Note: under review after minor revision, February 2018), 2018.
4. Bakolas, E., "Finite-horizon covariance control for discrete-time stochastic linear systems subject to input constraints," *Automatica*, vol. 91, pp. 61–68, 2018.
5. Bakolas, E., "Constrained minimum variance control for discrete-time stochastic linear systems," *Systems & Control Letters*, vol. 113, pp. 109–116, 2018.
6. Bakolas, E., "Distributed Partitioning Algorithms for Locational Optimization of Multi-Agent Networks in SE(2)," *IEEE Transactions on Automatic Control*, vol. 63, no. 1, pp. 101–116, 2018.
7. Bakolas, E., "On the finite-time capture of a fast moving target," *Optimal Control Applications and Methods*, vol. 38, no. 5, pp 778–794, 2017.
8. Bakolas, E. "Distributed Partitioning Algorithms for Multi-Agent Networks with Quadratic Proximity Metrics and Sensing Constraints," *Systems & Control Letters*, vol. 91, no. 5, pp. 36–42, 2016.
9. Bakolas, E. and Marchidan, A., "Time-Optimal Control of a self-propelled particle in a spatiotemporal flow field," *International Journal of Control*, vol. 89, no. 3, pp. 623–634, 2016.
10. Marchidan, A. and Bakolas, E., "Numerical Techniques for Minimum-Time Routing on a Sphere with Realistic Winds," *Journal of Guidance, Control, and Dynamics*, vol. 39, no. 1, pp. 188–193, 2016.
11. L'Afflito, A., Haddad, W. M., and Bakolas, E., "Partial-State Stabilization and Optimal Feedback Control," *International Journal of Robust and Nonlinear Control*, vol. 26, pp. 1026–1050, 2016.
12. Bakolas, E.,"Partitioning Algorithms for Multi-Agent Systems Based on Finite Time Proximity Metrics," *Automatica*, vol. 55, no. 5, pp. 176–182, 2015.

13. Bakolas, E., "Feedback Guidance in Uncertain Spatiotemporal Wind Using a Vector Backstepping Algorithm," *Journal of Guidance, Control, and Dynamics*, vol. 38, no. 4, pp. 631–642, 2015.

14. Bakolas, E., "Decentralized Spatial Partitioning Algorithms for Multi-Vehicle Systems Based on the Minimum Control Effort Metric," *Systems & Control Letters*, vol. 73, pp. 81–87, 2014.

15. Bakolas, E., "Feedback Guidance in Uncertain Spatiotemporal Wind Using a Vector Backstepping Algorithm," *Journal of Guidance, Control, and Dynamics*, vol. 38, no. 4, pp. 631–642, 2015.

16. Bakolas, E., "Decentralized Spatial Partitioning for Multi-Vehicle Systems in Spatiotemporal Flow-Field", *Automatica*, vol. 50, no. 9, pp. 2389–2396, 2014.

17. Bakolas, E., "Optimal Guidance of the Isotropic Rocket in the Presence of Wind", *Journal of Optimization Theory and Applications*, vol. 162, no. 3, p. 954–974, 2014.

18. Bakolas, E., "Optimal Partitioning for Multi-vehicle Systems Using Quadratic Performance Criteria", *Automatica*, vol. 49, no. 11, pp. 3377–3383, 2013.

19. Saleh, J. H., Haga, R. A., Favarò, F. M. and Bakolas, E., "Texas City Refinery Accident: Case Study in Breakdown of Defense-In-Depth and Violation of the Safety-Diagnosability Principle in Design", *Engineering Failure Analysis*, vol. 36, pp. 121–133, 2014.

20. Bakolas, E., and Tsiotras, P., "Optimal Partitioning for Spatiotemporal Coverage in a Drift Field", *Automatica*, vol. 49, no. 7, pp. 2064–2073, 2013.

21. Anderson, R., Bakolas, E., Milutinovic, D. and Tsiotras, P., "Optimal Feedback Guidance of a Small Aerial Vehicle in a Stochastic Wind", *Journal of Guidance, Control, and Dynamics*, vol. 36, pp. 975-985, 2013.

22. Bakolas, E., and Tsiotras, P., "Optimal Synthesis of the Zermelo-Markov-Dubins Problem in a Constant Drift Field", *Journal of Optimization Theory and Applications*, vol. 156, issue 2, pp. 469-492, 2013.

23. Bakolas, E., and Tsiotras, P., "Feedback navigation in an uncertain flow-field and connections with pursuit strategies", *Journal of Guidance, Control, and Dynamics*, vol. 35, no. 4, pp. 1268-1279, 2012.

24. Tsiotras, P., D. Jung, and E. Bakolas, "Multiresolution hierarchical path-planning using wavelet decompositions", *Journal of Intelligent & Robotic Systems*, vol. 66, no. 4, pp. 505-522, 2012.

25. Bakolas, E. and Tsiotras, P., "Relay Pursuit of a Maneuvering Target Using Dynamic Voronoi Diagrams", *Automatica*, vol. 48, no. 9, pp. 2213-2220, 2012.

26. Bakolas, E. and Saleh, J. H., "Augmenting defense-in-depth with the concepts of observability and diagnosability from Control Theory and Discrete Event Systems", *Reliability Engineering & System Safety*, vol. 96, no. 1, pp. 184-193, 2011.

27. Bakolas, E., and Tsiotras, P., "Optimal synthesis of the asymmetric sinistral/dextral Markov-Dubins problem", *Journal of Optimization Theory and Applications*, vol. 150, no. 2, pp. 233-250, 2011.

28. Saleh, J. H., Marais, K. B., Bakolas, E. and Cowlagi, R. V., "Highlights from the literature on accident causation and system safety: Review of major ideas, recent contributions, and challenges", *Reliability Engineering & System Safety*, vol. 95, no. 11, pp. 1105-1116, 2010.

29. Bakolas, E., and Tsiotras, P., "The Zermelo-Voronoi diagram: a dynamic partition problem", *Automatica*, vol. 46, no. 12, pp. 2059-2067, 2010.

Conference Publications

1. E. Bakolas, "A Solution to the Minimum L1-Norm Controllability Problem for Discrete-Time Linear Systems via Iteratively Reweighted Least Squares," American Control Conference. 2018.

2. D. Pylorof and Bakolas, E., "Robust Distributed and Decentralized Control of Large-Scale Nonlinear Systems with Input Constraints based on SOS Optimization," American Control Conference. 2018.

3. Bakolas, E. "Covariance Control for Discrete-Time Stochastic Linear Systems with Incomplete State Information," American Control Conference. Seattle, WA, 2017.

4. Selvakumar, J. and Bakolas, E., "Evasion with Terminal Constraints from a Group of Pursuers using a Matrix Game Formulation," American Control Conference. Seattle, WA, 2017.

5. Pylorof, D. and Bakolas, E., "Robust Control of Input Constrained Nonlinear Systems Subject to Unknown Bounded Disturbances Based on Convex Optimization," American Control Conference. Seattle, WA, 2017.

6. J. Selvakumar and Bakolas, E., "A pursuit-evasion game in the orbital plane," in 27th AAS / AIAA Space Flight Mechanics Meeting, San Antonio, TX, 2017.

7. Pylorof, D., Bettadpur, S. and Bakolas, E., "On the Robust Attitude Regulation for Earth Observation Spacecraft Under Hybrid Actuation," 27th AAS / AIAA Space Flight Mechanics Meeting. San Antonio, TX, February 2017.

8. Pylorof, D., Bakolas, E., and Russel, R., "A Nonlinear Controller for Low Thrust Stabilization of Spacecraft on CRTBP Orbits," 26th AAS/AIAA Space Flight Mechanics Meeting. Napa, CA, 2016.

9. Pylorof, D. and Bakolas, E., "Analysis and Synthesis of Nonlinear Controllers for Input Constrained Systems using Semidefinite Programming Optimization," American Control Conference. Boston, 2016.

10. Selvakumar, J. and Bakolas, E., "Evasion from a Group of Pursuers with a Prescribed Target Set for the Evader," American Control Conference. Boston, 2016.

11. Bakolas, E. "Optimal Covariance Control for Stochastic Linear Systems Subject to Integral Quadratic State Constraints," American Control Conference. Boston, 2016.

12. Pylorof, D. and Bakolas, E., "Nonlinear Control under Polytopic Input Constraints with Application to the Attitude Control Problem," American Control Conference. Chicago, 2015.

13. Selvakumar, J. and Bakolas, E., "Optimal Guidance of the Isotropic Rocket in a Partially Uncertain Flow," European Control Conference, 2015. Linz, Austria, 2015.

14. Pylorof, D. and Bakolas, E., "Tracking a Maneuvering Target with an Underactuated UAV in the SE(3) Space," AIAA Guidance, Navigation, and Control Conference, AIAA Science and Technology Forum 2015. Kissimee,Florida, 2015.

15. L'Afflitto, A., Haddad, W. M., and Bakolas, E., "State Feedback Control for Optimal Partial Asymptotic Stabilization," Conference on Decision and Control 2014. Los Angeles, CA, 2014.

16. Bakolas, E. "Partitioning Algorithms for Homogeneous Multi-Vehicle Systems with Planar Rigid Body Dynamics," Conference on Decision and Control. Los Angeles, CA, 2014.

17. Pylorof, D. and Bakolas, E., "Tracking a Maneuvering Target with an Underactuated UAV in the SE(3) Space," AIAA Guidance, Navigation, and Control Conference, AIAA Science and Technology Forum 2015. Kissimee,Florida, 2015.

18. Bakolas, E., "A Decentralized Spatial Partitioning Algorithm Based on the Minimum Control Effort Metric," American Control Conference. Portland, OR, 2014.

19. Bakolas, E., "Minimum Time Control for a Newtonian Particle in a Spatiotemporal Flow Field," American Control Conference. Portland, OR, 2014.

20. Bakolas, E., "Evasion from a group of pursuers with double integrator kinematics," Conference on Decision and Control, Florence, Italy, 2013.

21. Bakolas, E., "Optimal partitioning for task assignment of spatially distributed vehicles based on quadratic performance criteria," American Control Conference, Washington, DC, 2013.

22. Bakolas, E., "Spatial partitioning for distributed agents driven by a line-of-sight navigation law in a spatiotemporal drift field," American Control Conference, Washington, DC, 2013.

23. Anderson, R., Bakolas, E. Milutinovic, D. and Tsiotras, P., "The Markov-Dubins Problem in the Presence of a Stochastic Drift Field", 51st IEEE Conference on Decision and Control, Maui, Hawaii, pp. 130-135, 2012.

24. Haga, R. A., Saleh, J. H. and Bakolas, E., "Texas City Refinery Explosion: Case Study in Breakdown of Defense-In-Depth and Violation of the Safety-Diagnosability Principle", PSAM / ESREL, Helsinki, Finland, 2012.

25. Bakolas, E., Zhao, Y. and Tsiotras, P., "Initial Guess Generation for Aircraft Landing Trajectory Optimization", AIAA Guidance and Control Conference and Exhibit, Portland, OR, 2011.

26. Bakolas, E., and Tsiotras, P., "Optimal Pursuer and Moving Target Assignment using Dynamic Voronoi Diagrams", American Control Conference, San Francisco, CA, pp. 5444-5449, 2011.

27. Bakolas, E., and Tsiotras, P., "Relay Pursuit of a Maneuvering Target by a Group of Pursuers", 50th IEEE Conference on Decision and Control, Orlando, FL, pp. 4270-4275, 2011.

28. Bakolas, E., and Tsiotras, P., "Optimal Pursuit of Moving Targets using Dynamic Voronoi Diagrams", 49th IEEE Decision and Control Conference, Atlanta, GA, pp. 7431-7436, 2010.

29. Bakolas, E., and Tsiotras, P., "Time-Optimal Synthesis for the Zermelo-Markov-Dubins Problem: The Constant Wind Case", American Control Conference, Baltimore, MD, pp. 6163-6163, 2010.

30. Bakolas, E., and Tsiotras, P., "The Zermelo-Voronoi Diagram: a Dynamic Partition Problem", American Control Conference, Baltimore, MD, pp. 1320-1325, 2010.

31. Bakolas, E., and Tsiotras, P., "Minimum-Time Paths for a Light Aircraft in the Presence of Regionally-Varying Strong Winds," in Proceedings of ", AIAA Infotech "AT" Aerospace, Atlanta, Georgia, 20-22 July, 2010.

32. Bakolas, E., and Tsiotras, P., "The Asymmetric Sinistral/Dextral Markov-Dubins Problem", 48th IEEE Conference on Decision and Control, Shanghai, China, pp. 5649-5654, 2009.

33. Bakolas, E., and Saleh, J. H., "Augmenting the Traditional Defense-in-Depth Strategy with the Concept of a Diagnosable Safety Architecture", ESREL Conference, Prague, Czech Republic, pp. 2113-2122, 2009.

34. Bakolas, E., and Tsiotras, P., "On the Generation of Nearly Optimal, Planar Paths of Bounded Curvature and Bounded Curvature Gradient", American Control Conference, St. Louis, Missouri, pp. 385-390, 2009.

35. Bakolas, E., and Tsiotras, P., "Multiresolution Path-Planning Using Sector Based Decompositions from Sensor Data", AIAA Guidance and Control Conference and Exhibit, Honolulu, HW, 2008.

36. Bakolas, E., and Tsiotras, P., "On-Line, Kinodynamic Trajectory Generation through Rectangular Channels Using Path and Motion Primitives", IEEE Conference on Decision and Control, Cancun, Mexico, pp. 3725-3730, 2008.

37. Tsiotras, P., and Bakolas, E., "A Hierarchical On-Line Path-Planning Scheme Using Wavelets", European Control Conference, Kos, Greece, pp. 2807-2812, 2-5 July, 2007.

HONORS AND AWARDS

1. Outstanding Faculty Award for the ASE/EM Department, The University of Texas at Austin, 2016.

2. Best Presentation in Session, American Control Conference, 2010, 2014.

3. Letter of recognition for serving as an excellent reviewer for AIAA Journal of Guidance, Control, and Dynamics, 2011, 2013, 2014, 2015, 2016, 2017.

4. Scholarship for Greeks studying abroad at the PhD level from A. Onassis Public Benefit Foundation, 2008-2011.

5. Gerondelis Foundation Fellowship, 2007-2008.

6. Scholarship for Greeks studying abroad at the Master level from A. Onassis Public Benefit Foundation, 2005-2007.

7. Yearly Fellowship for Academic Excellence, Greek National Fellowship Institute, 1999-2004.

8. Yearly Fellowship for Academic Excellence, Technical Chamber of Greece, 1999-2004.

9. Academic Award D. Thomaidi, N.T.U.A, awarded to the top ranked student among all undergraduate students of the School of Mechanical Engineering, 2002-2003.

10. Annual Academic Award C. Papakyriakopoulou for Excellence in Mathematics, N.T.U.A., 1999-2001.

GRANTS AND CONTRACTS

As Principal Investigator:

1. Project/ Proposal Title: "EAGER: Microscopic Deployment Algorithms to Achieve Macroscopic Objectives for Spatially Distributed Stochastic Networks of Mobile Agents," PI: Efstathios Bakolas (single PI), Sponsor: NSF-CMMI, Awarded Amount to Date: $125,002.00; Performance Period: 04/01/2018-01/31/2020.

2. Project /Proposal Title: "Optimal Path Planning Among Mobile Sources of Threat in Complex Environments"; Project PI: Efstathios Bakolas (single PI), Sponsor NSF-CMMI, Awarded Amount to Date: $273,835; Performance Period: 09/01/2016 - 08/31/2019.

As Co-Principal Investigator or Investigator:

1. Project/Proposal Title: "Layered Software Architectures for Unmanned Aerial Vehicle Ground Control Systems," General Dynamics Mission Systems, co-PI (PI: M.R. Akella), total UT funding: $170,000, Bakolas share: $100,000, Performance Period: 08/17-07/18.

2. Project/Proposal Title: "Control, Navigation, & Guidance for Autonomous Spacecraft"; Project PI: D. F. Enns (Honeywell, MN), CoPIs: A. Acikmese (PI for Univ. of Washington), M. Akella (co-PI for Univ. Texas at Austin), E. Bakolas (PI for Univ. Texas at Austin) Source of Support: Air Force Research Laboratory (AFRL); Award Amount: $2,400,000 ($170,000 for UT); Period Covered: 05/11/2016 - 11/31/2018.

3. Project/Proposal Title: "Multi-Agent Management System (MAMS) for Air-Launched, Unmanned Vehicles," (Co-PI), amount $120,000 ($20,000 for Bakolas), AREA-I, Inc., (NASA SBIR, Phase I), July, 2013 – November, 2013.

SERVICE

Review Work

Reviewer for: 1) Automatica 2) IEEE Trans. Automatic Control, 3) IEEE Trans. Robotics, 4) IEEE Trans. Systems, Man, Cybernetics, Part B, 5) European Journal of Operational Research, 6) International Journal of Control, 7) Journal of Guidance, Control, and Dynamics, 8) International Game Theory Review, 9) Control Engineering Practice, 10) Journal of Dynamic Systems, Measurement, and Control, 11) Journal of Robotics, 12) IEEE Conference on Decision and Control, 13) American Control Conference

Conference Activities

Chair and co-chair in two sessions in American Control Conference 2013, 2014, 2015, 2016, 2017