Behçet Açıkmeşe, Ph.D.

CONTACT INFORMATION

Department of Aeronautics and Astronautics
University of Washington
Guggenheim Hall, 318A, Seattle, WA 98195-2400
url: www.aa.washington.edu/research/acl

(1-206) 616-3590 (office)
e-mail: behcet@uw.edu

EDUCATION

Purdue University

Ph.D., School of Aeronautics and Astronautics, West Lafayette, Indiana USA, December 2002.
- Dissertation: Stabilization, observation, tracking, and disturbance rejection for uncertain/nonlinear and time-varying systems. *Advisor*: Martin Corless
- Specialization in Controls and Dynamics with minor in Fluid Mechanics

M.S., School of Mechanical Engineering, Indianapolis, Indiana USA, May 1996.

Middle East Technical University

B.S., Department of Civil Engineering, Ankara, Turkey, June 1992.

ACADEMIC AND PROFESSIONAL EXPERIENCE

Associate Professor **01/2016- present**
Department of Aeronautics and Astronautics
Adjunct Professor in Electrical Engineering
University of Washington, Seattle, WA USA

Assistant Professor **08/2012- 12/2015**
Department of Aerospace Engineering and Engineering Mechanics
The University of Texas, Austin, Texas USA

Senior Technologist - Member of Technical Staff **04/2003 - 08/2012**
NASA Jet Propulsion Laboratory
California Institute of Technology, Pasadena, California USA

JPL Career highlights

- GN&C Analyst, SMAP (Soil Moisture Active Passive) mission of NASA launched in 2015. Developed flight GN&C algorithms for the Reaction Control System (RCS)
- GN&C Analyst, MSL (Mars Science Laboratory) mission of NASA, landed on Mars on 08/05/2012 Developed flight GN&C algorithms for the "flyaway" phase of the landing that performed successfully in flight, Aug. 5th, 2012 (see Fig. 1)
- Technical PI, "ADAPT: Autonomous Descent and Ascent Powered flight Testbed" First demonstration of the realtime convex optimization based control algorithm for planetary pinpoint landing, G-FOLD (Guidance for Fuel Optimal Large Divert), invented by B. Açıkmeşe

Lecturer **01/2012 - 05/2012**
Division of Engineering and Applied Science, Aerospace Engineering
California Institute of Technology, Pasadena, California USA

Visiting Assistant Professor **01/2003 - 03/2003**
School of Aeronautics and Astronautics
Purdue University, West Lafayette, Indiana USA

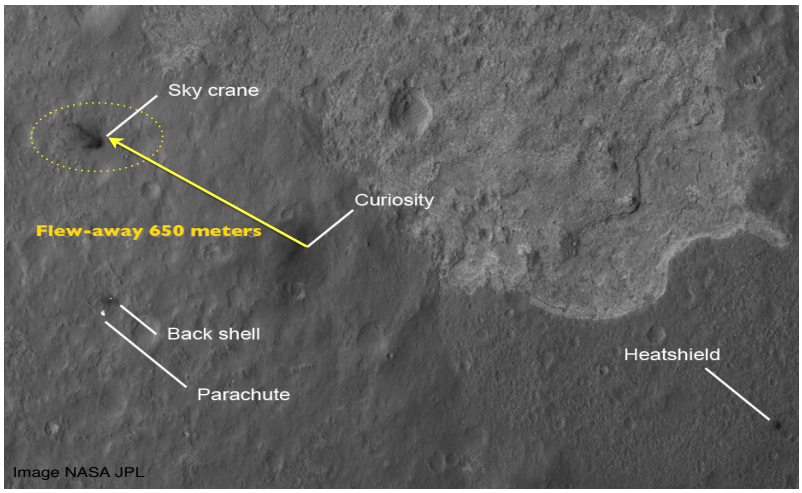

Figure 1: **Satellite Image of Curiosity Rover Landing on Mars, 08/05/2012** (courtesy of JPL): Dr. Açıkmeşe is a key member of the NASA MSL mission's EDL (Entry, Descent, and Landing) GN&C team. He developed the "flyaway" GN&C algorithms that autonomously flew the sky-crane to a safe distance of 650 meters away from the Curiosity rover, as captured by the satellite image above.

Research/Teaching Assistant Assistantships **August 1995 - August 2002**
Schools of Aeronautics and Astronautics, Mechanical and Electrical Engineering
Purdue University, West Lafayette, Indiana USA
Teaching Assistant Assistantships **October 1992 - June 1994**
Department of Civil Engineering, METU, Ankara, Turkey

Areas of Expertise

- Feedback control algorithm design and implementation
- Real-time optimization based trajectory optimization (guidance)
- Spacecraft translational and attitude guidance and control
- Rocket guidance and control
- State estimation algorithm design and implementation
- Real-time convex optimization
- Analysis and design of distributed control systems

University Committees Administrative Duties

Administrative Assignments
- Director, UWashington Autonomous Control Laboratory (ACL), 2016 - present
- Director, UTexas Autonomous Guidance, Navigation, and Control Laboratory, 2012–2015
- Faculty advisor, UTexas student chapter of AIAA, 2013–2015

Department Committees
- Head of international program committee, UWashington, 2016 – present
- Undergraduate committee, UWashington, 2016 – present
- New faculty search committee, UTexas, 2014

Memberships

Associate Fellow of AIAA, since 2013
Senior Member of IEEE, since 2008

Professional Service

Editorial Service

- Associate editor of IEEE Control System Technology, 01/2015 - current
- Associate editor of AIAA Journal of Guidance, Control, and Dynamics, 01/2016 - current

Committee Service

- AIAA Guidance, Navigation and Control Technical Committee, 02/2017 - current
- Member of Aerospace Control and Guidance Systems technical Committee (ACGSC), a non-profit organization with IEEE affiliation.

Promotion Committee

- Member of the jury for the "Habilitation diriger des recherches" (HDR) defense of Mr Pierre-Loc Garoche, September 2016, de l?Institut National Polytechnique de Toulouse, France.

NSF panelist: 7 panels from 2014 to 2017.

Workshop and tutorial sessions:

- Workshop (full day) on Model Predictive Control Under Uncertainty: Theory, Computations and Applications, American Control Conference, Boston, MA, July 2016, with Sasa Rakovic, William S. Levine, and Ilya Kolmanovsky.
- Workshop (half day) on Real-Time Optimization Based Autonomous Control, European Control Conference, Linz, Austria, July 2015, with Eric Feron, Alex Domahidi, and John Hauser.
- Workshop (3-day) on real-time optimization in control and guidance, Silverthome, CO, February 2014 and 2015, with Eric Feron and John Hauser.

Session chairs in the following conferences:

- American Control Conference (ACC)
- AIAA GN&C Conference
- IEEE Conference on Decision and Control (CDC)
- IFAC World Congress

Reviewer for the following journals:

- Automatica
- IEEE Transactions on Automatic Control
- AIAA Journal of Guidance, Control, and Dynamics
- International Journal of Robust and Nonlinear Control
- IEEE Transactions on Automation Science and Engineering
- IEEE Transactions on Control Systems Technology
- IEEE Transactions on Control of Network Systems
- Celestial Mechanics and Dynamical Astronomy
- Journal of Vibration and Control

Reviewer for the following conferences:

- American Control Conference
- IEEE Control and Decision Conference
- AIAA Guidance, Navigation, and Control Conference
- IFAC World Congress

Reviewer and monitor for NASA Small Business Innovation Research (SBIR) program

Recognitions and Awards

1. Best paper award for 2015, Asian Journal of Control, for "Markov chain approach to probabilistic guidance for swarms of autonomous agents".
2. NSF CAREER Award for "Real-time Convex Optimization for High-Performance Control of Autonomous Systems," 2015.
3. NASA Group Achievement Award for "Successfully demonstrating real-time terrain relative navigation and fuel-optimal trajectory planning on Masten's Xombie rocket vehicle," 2015.
4. NASA Group Achievement Award for "Exceptional performance in two successful test flights on Masten's rocket vehicle, demonstrating in-flight fuel-optimal trajectory planning and execution capabilities," 2014.
5. AIAA Associate Fellow, 2014
6. NASA Group Achievement Award for "Exceptional performance in the design, development, fabrication, test, and operation of the Mars Science Laboratory GN&C system," 2013.
7. AFRL Summer Faculty Fellowship, 2013 and 2014
8. JPL Summer Faculty Award, 2013
9. Purdue University President Council Guest of Honor for his key role in NASA MSL mission
10. IEEE Senior Member, 2009
11. NASA Group Achievement Award for "Outstanding development and ground demonstration of guidance and control technologies for spacecraft formation flying," 2009
12. JPL Mars Science Laboratory Team Bonus Award for "Successfully developing a highly innovative Entry, Descent, and Landing strategy for MSL," 2008
13. JPL Mariner Award for individual performance, 2005, 2008, 2009
14. JPL Team Award for Formation Flying Technology, 2006
15. NASA Team Bonus Award for Formation Control Testbed, 2004
16. JPL Spot Award for research on the stability of formation flying spacecraft, 2004
17. Purdue Research Foundation graduate research fellowship, 1999-2000
18. Graduate fellowship from Turkish Ministry of Education, 1994-1996
19. Graduate fellowship from The Scientific and Technological Research Council of Turkey, 1993
20. Over 15 NASA Tech Brief Awards

Completed Ph.D. Thesis Advising

In academia, after 08/2012

1. Daniel Dueri. Custom IPMs for Real-Time Solution of Optimal Control Problems. Ph.D., University of Washngton, September 2017 (to be completed).
2. Nazli Demirer. Probabilistic coordination of multi-vehicle systems. Ph.D., University of Washington, June 2017.
3. Roman J. Shor (co-advisor). The effect of well path, tortuosity and drillstring design on the transmission of axial and torsional vibrations from the bit and mitigation control strategies. Ph.D., The University of Texas at Austin, May 2016.
4. Matthew W. Harris. Convexification of optimal control problems. Ph.D., The University of Texas at Austin, May 2014.

Co-advising while at JPL, before 08/2012

5. Jordi Casoliva. Spacecraft Trajectory Generation by Successive Approximation for Powered Descent and Cyclers. Ph.D., University of California, Irvine, August 2013.
6. Milan Mandić. Decentralized estimation algorithms for formation flying with time-varying communication and sensing topologies. Ph.D., University of California at Los Angeles, June 2011.

7. John M. Carson. Robust model predictive control with a reactive safety mode, Ph.D., California Institute of Technology, May 2008.

Completed M.S. Thesis Advising

In academia, after 08/2012

1. Andrew W. Berning. Verification of successive convexification algorithm. The University of Texas at Austin, May 2016.
2. Timothy V. Lowery. The autonomous guidance, navigation, and control laboratory at the University of Texas at Austin. The University of Texas at Austin, December 2015.
3. Nazli Demir. Decentralized probabilistic density control of swarm of autonomous agents with conflict avoidance constraints. The University of Texas at Austin, August 2014.
4. Can Pehlivanturk. Lossless convexification of quadrotor motion planning with experiments. The University of Texas at Austin, August 2014.

Co-advising while at JPL, before 08/2012

5. Jason Keim. Inertia matrix estimation from spacecraft motion via semidefinite programming. M.S. Thesis, California State University, Los Angeles, 2007.

Postdoctoral Advising

1. Mahmoud El Chamie. Coordination and control of swarm of autonomous vehicles, Jan 2015-April 2017 (currently with United Technologies Research Center).
2. Carlo Alberto Pascucci. Predictive control for close-proximity spacecraft operations, Mar 2016–present.
3. Hossein Sartipizadeh. Robust model predictive control, Mar 2017–present.
4. Xiangru Xu. Robust motion planning, July 2017–present.

Current Thesis Advising

Ph.D. students

1. Utku Eren. Coordination of swarm of autonomous vehicles. Ph.D. student in AA, UW, May 2018.
2. Michael Szmuk. Implementation and Validation of Online Optimization-Based Control Algorithms. Ph.D. student in AA, UW, December 2018.
3. Can Pehlivanturk (co-advisor). Robust Control of Drill-String Vibrations, Ph.D. student in ME, UT Austin, December 2018.
4. Yuanqi Mao. Custom Algorithms for Solution of MICP Problems, Ph.D. student in AA, UW, September 2018.
5. Yue Yu. Application of convex optimization methods in aerospace control systems, Ph.D. student in AA, UW, June 2019.
6. Dylan Janak. Markov Decision Processes in autonomous systems, Ph.D. student in AA, UW, December 2018.
7. Sean Rice. Temporal logic specifications and model predictive control, Ph.D. Student in EE, UW, December 2018.
8. Adam M. Tahir. Control Synthesis for Biaffine Systems and Application to Coulomb Formation Flight. Ph.D. student in AA, UW, June 2019.

M.S. students

9. Mo Zhao. Implementation of autonomous control algorithms for indoor UAVs. MS student in AA, May 2018.

Journal Publications

Group members and graduate students advised are marked by "" and close collaborators are marked by "†".*

1. N. Demir*, M. El Chamie*, and **Açıkmeşe, Behçet**, "Safe markov chains for density control of on/off agents with observed transitions," *IEEE Transactions in Automatic Control*, revision in review (provisionally accepted), 2017
2. M. El Chamie*, Y. Yu*, **Açıkmeşe, Behçet**, and M. Ono†, "Controlled Markov processes with safety state constraints," *IEEE Transactions in Automatic Control*, revision in review (provisionally accepted), 2017
3. U. Eren*, A. Prach, B. Kocer, S. Rakovic†, E. Kayacan, and **Açıkmeşe, Behçet**, "Model predictive control in aerospace systems: Current state and opportunities," *AIAA Journal of Guidance, Control, and Dynamics*, Published online, January 2017.
https://arc.aiaa.org/doi/full/10.2514/1.G002507
4. U. J. Aarsnes†, **Açıkmeşe, Behçet**, A. Ambrus, and O. M. Aamo, "Robust controller design for automated kick handling in managed pressure drilling," *IFAC Journal of Process Control*, vol. 47, pp. 46–57, November 2016.
http://dx.doi.org/10.1016/j.jprocont.2016.09.001
5. D. P. Scharf†, D. Dueri*, **Açıkmeşe, Behçet**, J. Benito†, and J. Casoliva†, "Flight testing of real-time convex optimization based guidance algorithm G-FOLD - guidance for fuel optimal large divert," *AIAA Journal of Guidance, Control, and Dynamics*, no. 40, pp. 213–229, In press (17 pages), May 2016.
http://arc.aiaa.org/doi/abs/10.2514/1.G000399
6. D. Dueri*, **Açıkmeşe, Behçet**, D. P. Scharf†, and M. W. Harris*, "Customized real-time interior-point methods for onboard powered descent guidance," *AIAA Journal of Guidance, Control, and Dynamics*, no. 40, pp. 197–212, 2017.
http://dx.doi.org/10.2514/1.G001480
7. N. Demir*, U. Eren*, and **Açıkmeşe, Behçet**, "Decentralized probabilistic density control of mobile agent swarms with spatial and temporal safety constraints," *Autonomous Robots*, vol. 39, no. 4, pp. 537–554, 2015.
http://link.springer.com/article/10.1007/s10514-015-9470-z
8. D. Dueri*, F. Leve†, and **Açıkmeşe, Behçet**, "Minimum error dissipative power reduction control allocation via lexicographic convex optimization for momentum control systems," *IEEE Transactions on Control System Technology*, vol. 24, no. 2, pp. 678–686, 2016.
http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=7172519
9. **Açıkmeşe, Behçet**, N. Demir*, and M. W. Harris*, "Convex necessary and sufficient conditions for density safety constraints in markov chain synthesis," *IEEE Transactions on Automatic Control*, vol. 60, no. 10, pp. 2813–2818, 2015.
http://dx.doi.org/10.1109/TAC.2015.2400712
10. U. Eren*, D. Dueri*, and **Açıkmeşe, Behçet**, "Constrained reachability and controllability sets for planetary precision landing via convex optimization," *AIAA Journal of Guidance, Control,*

and Dynamics, vol. 38, no. 11, pp. 2067–2083, 2015.
http://arc.aiaa.org/doi/10.2514/1.G000882

11. **Açıkmeşe, Behçet**, M. Mandić*, and J. L. Speyer, "Decentralized observers with consensus filters for distributed discrete-time linear systems," *Automatica*, vol. 50, no. 4, pp. 1037–1052, 2014.
http://www.sciencedirect.com/science/article/pii/S0005109814000466
12. **Açıkmeşe, Behçet** and D. S. Bayard†, "Markov chain approach to probabilistic guidance for swarms of autonomous agents," *Asian Journal of Control*, vol. 17, no. 4, pp. 1105–1124, 2015.
http://dx.doi.org/10.1002/asjc.982
13. M. W. Harris* and **Açıkmeşe, Behçet**, "Lossless convexification of non-convex optimal control problems for state constrained linear systems," *Automatica*, vol. 50, no. 9, pp. 2304–2311, 2014.
http://www.sciencedirect.com/science/article/pii/S0005109814002362
14. **Açıkmeşe, Behçet**, S. W. Sell, A. M. S. Martin†, and J. J. Biesiadecki, "Mars science laboratory flyaway guidance, navigation, and control system design," *AIAA Journal of Spacecraft and Rockets*, vol. 51, no. 4, pp. 1227–1236, 2014.
http://arc.aiaa.org/doi/abs/10.2514/1.A32709
15. M. W. Harris* and **Açıkmeşe, Behçet**, "Maximum divert for planetary landing using convex optimization," *Journal of Optimization Theory and Applications*, vol. 162, no. 3, pp. 975–995, 2014.
http://link.springer.com/article/10.1007/s10957-013-0501-7
16. M. W. Harris* and **Açıkmeşe, Behçet**, "Minimum time rendezvous of multiple spacecraft using differential drag," *AIAA Journal of Guidance, Control, and Dynamics*, vol. 37, no. 2, pp. 365–373, 2014.
http://arc.aiaa.org/doi/abs/10.2514/1.61505
17. J. M. Carson†, D. S. Bayard†, and **Açikmese, Behçet**, "In-flight dynamical method to verify sample collection for small-body sample return mission," *Journal of Spacecraft and Rockets*, vol. 50, no. 1, pp. 230–243, 2013.
http://arc.aiaa.org/doi/abs/10.2514/1.A32273?journalCode=jsr
18. **Açıkmeşe, Behçet**, J. M. Carson†, and L. Blackmore†, "Lossless convexification of the soft landing optimal control problem with non-convex control bound and pointing constraints," *IEEE Transactions on Control Systems Technology*, vol. 21, no. 6, pp. 2104–2113, 2013.
http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=6428631
19. J. M. Carson†, **Açıkmeşe, Behçet**, R. M. Murray, and D. G. MacMartin, "A robust model predictive control algorithm augmented with a reactive safety mode," *Automatica*, vol. 49, no. 5, pp. 1251–1260, 2013.
http://www.sciencedirect.com/science/article/pii/S0005109813001143
20. D. Morgan, S.-J. Chung, L. Blackmore†, **Açıkmeşe, Behçet**, D. Bayard†, and F. Y. Hadaegh, "Swarm-keeping strategies for spacecraft under J2 and atmospheric drag perturbations," *Journal of Guidance, Control, and Dynamics*, vol. 35, no. 5, pp. 1492–1506, 2012.
http://arc.aiaa.org/doi/abs/10.2514/1.55705
21. L. Blackmore†, **Açıkmeşe, Behçet**, and J. M. Carson†, "Lossless convexification of control constraints for a class of nonlinear optimal control problems," *Systems & Control Letters*, vol. 61, no. 8, pp. 863–870, 2012.
http://www.sciencedirect.com/science/article/pii/S0167691112000874

22. **Açıkmeşe, Behçet** and L. Blackmore†, "Lossless convexification of a class of optimal control problems with non-convex control constraints," *Automatica*, vol. 47, no. 2, pp. 341–347, 2011. http://www.sciencedirect.com/science/article/pii/S0005109810004516
23. **Açıkmeşe, Behçet** and M. Corless†, "Observers for systems with nonlinearities satisfying incremental quadratic constraints," *Automatica*, vol. 47, no. 7, pp. 1339–1348, 2011. http://www.sciencedirect.com/science/article/pii/S000510981100118X
24. **Açıkmeşe, Behçet**, J. M. Carson†, and D. S. Bayard†, "A robust model predictive control algorithm for incrementally conic uncertain/nonlinear systems," *International Journal of Robust and Nonlinear Control*, vol. 21, no. 5, pp. 563–590, 2011. http://dx.doi.org/10.1002/rnc.1613
25. L. Blackmore, **Açıkmeşe, Behçet**, and D. P. Scharf†, "Minimum-landing-error powered-descent guidance for Mars landing using convex optimization," *Journal of guidance, control, and dynamics*, vol. 33, no. 4, pp. 1161–1171, 2010. http://arc.aiaa.org/doi/abs/10.2514/1.47202?journalCode=jgcd
26. **Açıkmeşe, Behçet** and M. Corless†, "Stability analysis with quadratic lyapunov functions: Some necessary and sufficient multiplier conditions," *Systems & control letters*, vol. 57, no. 1, pp. 78–94, 2008. http://www.sciencedirect.com/science/article/pii/S0167691107000941
27. **Açıkmeşe, Behçet**, F. Y. Hadaegh, D. P. Scharf†, and S. R. Ploen†, "Formulation and analysis of stability for spacecraft formations," *IET Control Theory & Applications*, vol. 1, no. 2, pp. 461–474, 2007. http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=4123987
28. **Açıkmeşe, Behçet** and S. R. Ploen†, "Convex programming approach to powered descent guidance for Mars landing," *Journal of Guidance, Control, and Dynamics*, vol. 30, no. 5, pp. 1353–1366, 2007. http://arc.aiaa.org/doi/abs/10.2514/1.27553?journalCode=jgcd
29. **Açıkmeşe, Behçet** and M. Corless, "Robust tracking and disturbance rejection of bounded rate signals for uncertain/nonlinear systems," *International Journal of Control*, vol. 76, no. 11, pp. 1129–1141, 2003. http://www.tandfonline.com/doi/abs/10.1080/0020717031000124156
30. **Açıkmeşe, Behçet** and M. Corless, "Robust output tracking for uncertain/nonlinear systems subject to almost constant disturbances," *Automatica*, vol. 38, no. 11, pp. 1919–1926, 2002. http://www.sciencedirect.com/science/article/pii/S0005109802000717

Manuscripts in Review

1. M. El Chamie and B. Açıkmeşe. Markov Decision Processes with Sequential Sensor Measurements.*Automatica*, **in review**, May 2017.
2. M. El Chamie and B. Açıkmeşe. Robustly Safe Metropolis-Hastings Algorithm and Its Application to Swarm Control,*System and Control Letters*, **revision in review**, April 2017.

Book Chapters

1. M. Pavone, B. Açıkmeşe, and I. Nesnas. Spacecraft Autonomy Challenges for Next Generation Space Missions. Eric Feron (Ed.), Advances in Control System Technology for Aerospace Applications, Lecture Notes in Control and Information Sciences (LNCIS), pp. 1–48, Springer-Verlag. **http://link.springer.com/book/10.1007/978-3-662-47694-9**

2. F. Y. Hadaegh, A. Johnson, D. S. Bayard, B. Açıkmeşe, S.J. Chung, and R. Mehra. New Guidance, Navigation, and Control Technologies for Formation Flying Spacecraft and Planetary Landing. Eric Feron (Ed.), Advances in Control System Technology for Aerospace Applications, Lecture Notes in Control and Information Sciences (LNCIS), pp. 49–80, ,Springer-Verlag.
http://link.springer.com/book/10.1007/978-3-662-47694-9
3. F. Y. Hadaegh, B. Açıkmeşe, D. S. Bayard, G. Singh, M. Mandic, S.-J. Chung, and D. Morgan. Guidance and Control of Formation Flying Spacecraft: From Two to Thousands. Festschrift honoring John L. Junkins, Tech Science Press, pages 327-371, 2012.
4. F. Y. Hadaegh, G. Singh, B. Açıkmeşe, D. P. Scharf, and M. Mandic. Guidance and control of formation flying spacecraft. The path to autonomous robots. Springer-Verlag, NewYork, October, 2008.

Patents

1. M.W. Harris, B. Açıkmeşe, E. van Oort. LMI-Based Control of stick-slip oscillations in drilling. Provisional Patent Appplication with US Patent Office, October 2014.
2. B. Açıkmeşe, L. Blackmore, and D. P. Scharf. Method and apparatus for powered descent guidance. CIT-5281, US Patent US Patent US 8,489,260, July 2013.
3. B. Açıkmeşe and David S. Bayard. Probabilistic guidance for swarms of autonomous agents. CIT-5737-P, Caltech Provisional Patent Application with the US Patent Office, December 2010.
4. John M. Carson and B. Açıkmeşe. A smart-divert enhancement for powered descent guidance based on the backshell dispersion ellipse. CIT-5741-P, Caltech Provisional Patent Application with the US Patent Office, December 2010.
5. B. Açıkmeşe, John M. Carson, and Lars Blackmore. Powered descent guidance with general thrust-pointing constraints. CIT-5739-P, Caltech Provisional Patent Application with the US Patent Office, December 2010.

Algorithm Validation Test Flights

1. TRN (Terrain Relative Navigation)/G-FOLD (Guidance for Fuel Optimal Large Divert) test light demonstrating onboard autonomous vision based navigation together with real-time optimization based control, 2014.
`http://www.nasa.gov/jpl/successful-test-flights-for-mars-landing-technology/index.html`.
2. 800 m Divert flight testing of G-FOLD (Guidance for Fuel Optimal Large Divert): Convex optimization based Guidance algorithm for Fuel Optimal Large Divert, 2013.
`http://www.jpl.nasa.gov/video/?id=1270`.
3. 750 m Divert flight testing of G-FOLD (Guidance for Fuel Optimal Large Divert): Convex optimization based Guidance algorithm for Fuel Optimal Large Divert, 2012.
`http://www.youtube.com/watch?v=jl6pw2oossU`.
4. 650 m Divert flight testing of G-FOLD (Guidance for Fuel Optimal Large Divert): Convex optimization based Guidance algorithm for Fuel Optimal Large Divert, 2012.
`http://www.youtube.com/watch?v=WU4TZlA3jsg`.
5. 500 m Divert flight testing of G-FOLD (Guidance for Fuel Optimal Large Divert): Convex optimization based Guidance algorithm for Fuel Optimal Large Divert, 2012.
`http://www.youtube.com/watch?v=1GRwimo1AwY`.

Conference Publications

1. Z. Mian, D. Dueri, Y. Mao, J. Ding, **Açıkmeşe, Behçet**, and M. Mesbahi, "Trajectory optimization with inter-sample obstacle avoidance via successive convexification," in *Conference on Decision and Control (CDC)*, IEEE, to appear, 2017
2. M. El Chamie†, **Açıkmeşe, Behçet**, and M. Mesbahi, "Online learning for markov decision processes applied to multi-agent systems," in *Conference on Decision and Control (CDC)*, IEEE, to appear, 2017
3. M. Szmuk*, C. A. Pascucci*, D. Dueri*, and B. Açikmeşe, "Convexification and real-time on-board optimization for agile quad-rotor maneuvering and obstacle avoidance," in *Proceedings of the 2017 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, to appear, 2017
4. Y. Mao*, D. Dueri*, and **Açıkmeşe, Behçet**, "Successive convexification of non-convex optimal control problems with state constraints," in *IFAC World Congress*, pp. 4124–4130, 2017
5. U. Eren* and **Açıkmeşe, Behçet**, "Velocity field generation for density control of swarms using heat equation and smooth kernels," in *IFAC World Congress*, pp. 9815–9821, 2017
6. C. Pascucci*, M. Szmuk*, and **Açıkmeşe, Behçet**, "Optimal real-time force rendering for on-orbit structure assembly," in *10th ESA Conference on Guidance, Navigation, and Control*, May, 2017
7. C. A. Pascucci*, M. Szmuk*, and B. Açikmeşe, "Optimal control allocation for a multi-engine overactuated spacecraft," in *Aerospace Conference, 2017 IEEE*, pp. 1–6, IEEE, 2017. http://ieeexplore.ieee.org/document/7943690/
8. M. El Chamie* and **Açıkmeşe, Behçet**, "Necessary and sufficient conditions for distributed averaging with state constraints," in *American Control Conference (ACC)*, pp. 2008–2013, IEEE, 2017
9. M. El Chamie* and **Açıkmeşe, Behçet**, "Necessary and sufficient conditions for distributed averaging with state constraints," in *American Control Conference (ACC)*, pp. 2008–2013, IEEE, 2017
10. M. Szmuk*, U. Eren*, and **Açıkmeşe, Behçet**, "Successive convexification for Mars 6-dof powered descent landing guidance," in *AIAA Scitech Conference, Grapevine, TX*, p. 1500, 2017. https://arc.aiaa.org/doi/pdf/10.2514/6.2017-1500
11. Y. Mao*, M. Szmuk*, and **Açıkmeşe, Behçet**, "Successive convexification of non-convex optimal control problems and its convergence properties," in *Conference on Decision and Control (CDC)*, pp. 3636–3641, IEEE, 2016. http://ieeexplore.ieee.org/abstract/document/7798816/
12. S. Rakovic†, W. S. Levine, and **Açıkmeşe, Behçet**, "Continuously generalized model predictive control," in *Conference on Decision and Control (CDC)*, pp. 616–621, IEEE, 2016. http://ieeexplore.ieee.org/abstract/document/7798337/
13. M. El Chamie*, J. Liu, T. Başar, and **Açıkmeşe, Behçet**, "Distributed averaging with quantized communication over dynamic graphs," in *Conference on Decision and Control (CDC)*, pp. 4827–4832, IEEE, 2016. http://ieeexplore.ieee.org/abstract/document/7799006/
14. J. Liu, M. El Chamie*, T. Başar, and **Açıkmeşe, Behçet**, "The discrete-time Altafini model of opinion dynamics with communication delays and quantization," in *Conference on Decision and*

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SOFTWARE

- B-OPT: Primal-dual interior point method solver for Second-Order-Cone-Programming (SOCP) problems of convex optimization (available in Matlab and C), December 2012.
- G-FOLD: Fuel optimal trajectory generation software for planetary landing (available in Matlab and C-flight code), June 2013.
- G-OPT: Primal-dual interior point method solver for SOCP problems of convex optimization (available in Matlab), September 2006.
- G-DYN: A multi-body simulation software for automatically assembling and integrating the equations of motion (available in Matlab), September 2010.

PUBLISHED NASA TECH BRIEFS

1. Probabilistic Guidance for Swarms of Autonomous Agents. March 2014.
2. An augmentation of G-guidance algorithms. January 2011.
3. Autonomous GN&C for spacecraft exploration of comets and asteroids. November 2010.
4. A table lookup solution algorithm of the optimal powered descent guidance problem for planetary landing: Version-1. July 2010.
5. Reactive collision avoidance algorithm. May 2010.
6. Enhanced pseudo-waypoint guidance for spacecraft maneuvers. October 2008.
7. Attitude control algorithm for minimizing Maneuver execution error. July 2008.
8. G-Guidance interface design for small body mission simulation. June 2008.
9. Force control algorithm for surface sampling. June 2008.
10. Pseudo-waypoint guidance for proximity spacecraft maneuvers. June 2007.
11. A robustly stabilizing model predictive control algorithm. May 2007.
12. Controlling attitude of a solar-sail spacecraft using vanes. July 2006.
13. Algorithm optimally allocates actuation of a spacecraft. July 2007.
14. Estimating the inertia matrix of a spacecraft. November 2007.
15. Implementation of an IPM algorithm for real-time convex optimization. December 2007.
16. Telescope formation at L2 for observing Earth's atmosphere. September 2007.
17. Control of solar sail spacecraft attitude and thrust vector by articulated vanes. March, 2006.
18. Algorithms for maneuvering spacecraft around small bodies. August 2006.
19. Optimal guidance algorithms for small body explorations. September, 2005.

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Invited Talks and Lectures

1. Convexification-Based Real-Time Optimization for High Performance Autonomous Control, Istanbul Technical University, Istanbul, Turkey, July 2017.
2. Convexification-based Real-Time Optimization for High Performance Autonomous Control. Automatic Control Lab, ETH, Zurich, November 2016.
3. Convexification-Based Real-Time Optimization for High Performance Autonomous Control. Trends in Optimization Seminar, University of Washington, May 2016.
4. Duality Theory for Convexification of Autonomous Control Problems. Washington State University, Pullman, WA, April 2016.
5. Convexification of Autonomous Control Problems. Jet Propulsion Laboratory, Pasadena, Ca, March 2015.
6. Convex optimization applications in autonomous systems. VORACE-2 Workshop on Optimization Theory and Applications, Toulouse, France, June 2015.
7. Convexification-Based Real-Time Optimization for High Performance Autonomous Control, University of California, Los Angeles, March 2015.
8. Convexification-Based Real-Time Optimization for Robust Autonomous Control. University of Washington, Seattle, February 2015.
9. Duality Theory for Convexification of Autonomous Control Problems. Concordia University, Montreal, Canada, January 2015.

10. Convexification and Realtime Optimization for Autonomous Control. NASA Jet Propulsion Laboratory, Pasadena, CA, December 2014.
11. Duality Theory for Convexification of Autonomous Control Problems. Stanford University, Palo Alto, CA, December 2014.
12. Convexification and Realtime Optimization for Autonomous Control. NASA Ames Research Laboratory, San Jose, CA, December 2014.
13. Verifiable Convex Optimization of Autonomous Control Problems. Embry Riddle University, Daytona Beach, FL, November 2014.
14. Duality Theory for Convexification of Autonomous Control Problems. University of Michigan, Ann Arbor, MI, October 2014.
15. Duality Theory for Convexification of Autonomous Control Problems. Georgia Tech, Atlanta, GA, September 2014.
16. Duality Theory for Convexification of Autonomous Control Problems. Virginia Tech, Blacksburg, VI, September 2014.
17. Duality Theory for Convexification of Autonomous Control Problems. Texas A&M, College Station, TX, September 2014.
18. Duality Theory for Convexification of Control Problems. United Technologies Research Center, Hartford, CT, June 2014.
19. Convexification and Realtime Optimization for Autonomous Control. ONR Program Review, MIT, Boston, MA, June 2014.
20. Duality Theory for Convexification of Control Problems. VORACE Workshop on Optimization Theory and Applications, Toulouse, France, May 2014.
21. Duality Theory for Convexification of Control Problems and Applications. Texas System Days, College Station, Texas, March 2014.
22. Duality Theory for Convexification of Control Problems and Applications. Aerospace Control and Guidance Systems Committee Meeting, Denver, Colorado, March 2014.
23. Real-Time convex optimization for control of autonomous vehicles. University of Washington, Seattle, Washington, October 2013.
24. Verifiable real-time convex optimization for control of autonomous vehicles: A progress update. Aerospace Control and Guidance Systems Committee Meeting, Annapolis, Maryland, October 2013.
25. Real-time Convex Optimization for Autonomous Control. Kirtland Air Force Base, Albuquerque, New Mexico, July 2013.
26. Real-time Convex Optimization for Autonomous GN&C. NASA Jet Propulsion Laboratory, August 2013.
27. Verifiable Real-Time Convex Optimization for GN&C of Autonomous Vehicles. NASA Johnson Space Center, May 2013.
28. Verifiable Real-Time Convex Optimization for Control of Autonomous Vehicles with Applications to Mars Entry, Descent, and Landing. Aerospace Control and Guidance Systems Committee Meeting, Reno, NV, March 2013.
29. Real-Time optimization for control of advanced autonomous systems, Naval Postgraduate School , Monterey, California, November 2012.
30. Real-Time optimization for control of advanced autonomous systems, Kirtland Air Force Base, Albuquerque, New Mexico, November 2012.
31. Onboard convex optimization for control of advanced autonomous systems, Wright-Petterson Air Force Base, Dayton, Ohio, November 2012.
32. Onboard convex optimization for control of advanced autonomous systems, Scott Air Force Base, Scott AFB, Illinois, October 2012.

33. Onboard convex optimization for autonomous spacecraft control, University of Illinois, Urbana-Champaign, Illinois, October 2012.
34. Advanced autonomous spacecraft control, Civil Engineering Seminars, The University of Texas at Austin, Austin, Texas, October 2012.
35. Onboard convex optimization for autonomous spacecraft control, Purdue University, West Lafayette, Indiana, October 2012.
36. G-FOLD: Fuel Optimal Large Divert Powered Descent Guidance Algorithm, BlueOrigin Company. Kent, Washington, September, 2012.
37. Onboard guidance, navigation, and control of advanced autonomous systems, University of Texas, Austin, April 2012.
38. Onboard guidance, navigation, and control of advanced autonomous systems, University of Florida, Gainesville, Florida, March 2012.
39. Onboard guidance, navigation, and control of advanced autonomous systems, University of Washington. Seattle, Washington, February 2012.
40. Real-time convex optimization enabling next generation autonomous entry, descent, and landing GN&C, BlueOrigin Company. Kent, Washington, January 2012.
41. Onboard guidance, navigation, and control of advanced autonomous systems, University of California, Berkeley. Berkeley, California, June 2011.
42. Onboard guidance, navigation, and control of advanced autonomous systems, Iowa State University. Ames, Iowa, April 2011.
43. Onboard guidance, navigation, and control of advanced autonomous systems, Massachusetts Institute of Technology. Boston, Massachusetts, April 2011.
44. Onboard guidance, navigation, and control of advanced autonomous systems, George Washington University. Washington, D.C., April 2011.
45. Onboard guidance, navigation, and control of advanced autonomous systems, University of Texas. Arlington, Texas, March 2011.
46. Onboard Guidance, Navigation, and Control of Advanced autonomous Systems, University of Kansas. Lawrence, Kansas, March 2011.
47. Convex Optimization-I: Planetary landing powered descent guidance. JPL Optimization Lecture Series. Pasadena, California. March 2010.
48. A robust model predictive control algorithm with proven resolvability. Control and Dynamical Systems Seminar. California Institute of Technology. Pasadena, California. July 2006.
49. Attitude dynamics and control of solar sails with articulated vanes. Invited Session. AIAA Guidance, Navigation, and Control Conference and Exhibit. San Fransisco, California. August 2005.
50. Introduction to convex optimization with applications in guidance and control. JPL Optimization Lecture Series. Pasadena, California. April 2005.
51. Research in autonomous guidance and control at NASA-JPL. Izmir Institute of Technology, Izmir, Turkey. December 2005.
52. State and observer based output feedback controllers for nonlinear systems. JPL Seminar. Pasadena, California. June 2002.
53. Stabilization and tracking for nonlinear/uncertain systems. AFRL, Wright-Patterson Air Force Base, Dayton Ohio. May 2002.
54. Robust tracking for nonlinear/unceratin systems via LMIs. Seminar at MathWorks, Natick, Massachusetts. March 2002.
55. Parallel solutions of Navier-Stokes equations. Structural Engineering Seminar Series, Purdue University, West Lafayette, Indiana. April 1997.