Short CV- Rafael Vazquez

Personal Data

Full Name: Rafael Vazquez Valenzuela **Nationality**: Spanish
Date of Birth: 7 April 1975
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Current position: Associate Professor (Profesor Titular), Aerospace Engineering Department, University of Seville, Spain
Courses taught: Signals and Systems (UCSD), Linear Control (UCSD), Astronautics (U. Seville), Space Vehicles (U. Seville), Air Navigation (U. Seville)

Professional Experience

2001-2002	Systems Engineer in Telvent Interactiva (Seville, Spain)
2003-2006	M.Sc. and Ph.D. in Aerospace Engineering (University of California, San Diego, USA)
2007-2010	Assistant Professor in the Aerospace Engineering Deparment, Univ. of Seville, Spain
2010-present	Associate Professor (Tenured) in the Aerospace Engineering Deparment, University of Seville, Spain

Education

Ph.D. in Aerospace Engineering, 2006, University of California, San Diego (advisor: Miroslav Krstic)
Master in Aerospace Engineering, 2004, University of California, San Diego
B.S. in Electrical Engineering, 1999, University of Seville, Spain
B.S. in Mathematics, 2003, University of Seville, Spain

Awards and Honors

Finalist of the 2005 IEEE CDC Best Student Paper Award.
E.U. Marie Curie Fellow, 2005, CTS (Control Training Site) Program.

Service

Associate Editor of Automatica (since 2015)

Member of the following technical committees:
-**IFAC TC on Aerospace** (since 2009)
-**IFAC TC on Distributed Parameter Systems** (since 2011)
-**IEEE TC on Distributed Parameter Systems** (since 2012)

Reviewer of the journals/conferences: Physics of Fluids, Automatica, Journal of Fluid Mechanics, American Control Conference, IEEE Conference on Decision and Control, ASME Journal of Dynamic Systems, Measurement and Control, Ultramicroscopy, IEEE Transactions on Automatic Control, Optimal Control Applications and Methods, Journal of the Franklin Institute, System and Control Letters, European Control Conference, SIAM Journal on Control and Optimization, Indian Journal of Pure and Applied Mathematics, IEEE Transactions on Control Systems Technology, IEEE Transactions on Systems, Man, and Cybernetics, International Journal of Control, IFAC World Congress.

Publications

Books

1. R. Vazquez and M. Krstic, Control of Turbulent and Magnetohydrodynamic Channel Flows, Birkhauser, 2007.

Book Chapters

1. M. Krstic, J. Cochran, and R. Vazquez, "Backstepping Controllers for Stabilization of Turbulent Flow PDEs," in P. Ioannou and I. Pitsilides (Eds.), Modeling and Control of Complex Systems, CRC Press, 2007.
2. R. Vazquez, E. Trelat, J.-M. Coron, "Fast Tracking of Poiseuille Trajectories in Navier-Stokes 2-D Channel Flow," F. Lamnabhi-Lagarrigue, S. Laghrouche, A. Loria and E. Panteley (Eds.), Taming Heterogeneity and Complexity of Networked Embedded Systems, ISTE Ltd., London, UK, 2007.
3. R. Vazquez and M. Krstic, "Stabilization of fluid flows," in W. S. Levine (Ed.), 2nd edition, The Control Handbook, Taylor & Francis, 2010.

Journal Papers

1. Rafael Vazquez and M. Krstic, "Explicit Integral Operator Feedback for Local Stabilization of Nonlinear Thermal Convection Loop PDEs," to appear, System and Control Letters, vol. 55, pp. 624-632, 2006.
2. F. J. Rubio-Sierra, R. Vazquez and R. W. Stark, "Transfer function analysis of the micro cantilever used in atomic force microscopy," IEEE Transactions on Nanotechnology, vol. 5, pp. 692-700, 2006.
3. R. Vazquez, F. J. Rubio-Sierra and R. W. Stark, "Multimodal analysis of force spectroscopy based on a transfer function study of micro-cantilevers," Nanotechnology, vol. 18, 185504, 2007.
4. Rafael Vazquez and M. Krstic, "A closed-form feedback controller for stabilization of the linearized 2D Navier-Stokes Poiseuille flow," IEEE Transactions on Automatic Control, vol. 52(12), pp. 2298-2312, 2007.
5. R. Vazquez, E. Schuster and M. Krstic, "Magnetohydrodynamic state estimation with boundary sensors," Automatica, vol. 44, 2517-2527, 2008.
6. R. Vazquez, E. Trelat and J.-M. Coron, "Control for fast and stable laminar-to- high-Reynolds-numbers transfer in a 2D Navier-Stokes channel flow," Discrete and Continuous Dynamical Systems Ð Series B, vol. 10, pp. 925-956, 2008.
7. C. Xu, E. Schuster, R. Vazquez and M. Krstic, "Stabilization of linearized 2D magnetohydrodynamic channel flow by backstepping boundary control," System and Control Letters, vol. 57, pp. 805-812, 2008.
8. M. Krstic, L. Magnis, and R. Vazquez, "Nonlinear stabilization of shock-like unstable equilibria in the viscous Burgers PDE," IEEE Transactions on Automatic Control, vol. 53, pp. 1678-1683, 2008.
9. R. Vazquez and M. Krstic, "Control of 1-D parabolic PDEs with Volterra nonlinearities - Part I: Design," Automatica, vol. 44, 2778-2790 , 2008.
10. R. Vazquez and M. Krstic, "Control of 1-D parabolic PDEs with Volterra nonlinearities - Part II: Analysis," Automatica, vol. 44, 2791-2803, 2008.
11. M. Krstic, L. Magnis, and R. Vazquez, "Nonlinear control of the Burgers PDE: Trajectory generation, tracking, and observer design," ASME Journal of Dynamic Systems, Measurement and Control, vol. 131, 021012, 2009.
12. R. Vazquez, E. Schuster and M. Krstic, "A closed-form feedback controller for stabilization of 3D magnetohydrodynamic channel flow," ASME Journal of Dynamic Systems, Measurement and Control, vol. 131, 041001, 2009.
13. R. Vazquez and M. Krstic, "Boundary observer for output-feedback stabilization of thermal convection loop," IEEE Transactions on Control Systems Technology, vol. 18, 789-797, 2010.
14. R. Vazquez and A. M. Gañan-Calvo, "An operational calculus framework to characterize droplet size populations from turbulent breakup by a small number of parameters," Journal of Physics A, vol. 43, 185501, 2010.
15. F. Gavilan, R. Vazquez and E. F. Camacho, "Chance-constrained Model Predictive Control for Spacecraft Rendezvous with Disturbance Estimation", Control Engineering Practice, vol 20 (2), 111-122, 2012.
16. R. Vazquez, D. Rivas, "Propagation of Initial Mass Uncertainty in Aircraft Cruise Flight," Journal of Guidance, Control and Dynamics, vol. 36 (2), 415-429, 2013.
17. J.-M. Coron, R. Vazquez, M. Krstic, and G. Bastin, “Local exponential H2 stabilization of a 2x2 quasilinear hyperbolic system using backstepping,” SIAM Journal on Control and Optimization, vol. 51(3), 2005-2035, 2013.
18. F. Di Meglio, R. Vazquez, and M. Krstic, “Stabilization of a system of n + 1 coupled first-order hyperbolic linear PDEs with a single boundary input," IEEE Transactions on Automatic Control, vol. 58(12), 3097-3111, 2013.

19. R. Vazquez and M. Krstic, “Marcum Q-functions and Explicit Kernels for Stabilization of 2x2 Linear Hyperbolic Systems with Constant Coefficients,” System and Control Letters, vol. 68, 33-42, 2014.
20. R. Vazquez, F. Perea, J. Galan-Vioque, "Resolution of an Antenna-Satellite assignment problem by means of Integer Linear Programming," Aerospace Science and Technology, vol. 39, pp. 567-574, 2014.
21. A. Cook, H.A.P. Blom, F. Lillo, R. N. Mantegna, S. Micciche, D. Rivas, R. Vazquez, and M. Zanin,"Applying complexity science to air traffic management," Journal of Air Transport Management, vol. 42, pp. 149-158, 2015.
22. F. Gavilan, R. Vazquez and J. A. Acosta, "Adaptive Backstepping Control for UAV Longitudinal Flight Dynamics with Thrust Saturation," Journal of Guidance, Control and Dynamics, Vol. 38, No. 4, pp. 651-661, 2015.
23. J. Qi, R. Vazquez, M. Krstic, "Multi-agent Deployment in 3-D via PDE Control," IEEE Transactions on Automatic Control, vol. 60 (4), pp. 891-906, 2015.
24. F. Perea, R. Vazquez, J. Galan-Vioque, "Swath acquisition planning in multiple-mission EOSs: exact and heuristic approaches," IEEE Transactions on Aerospace and Electronic Systems, vol. 51, No. 3, pp. 1717-1725, 2015.
25. F. Gavilan, R. Vazquez, E. F. Camacho, "An Iterative Model Predictive Control Algorithm for UAV Guidance," IEEE Transactions on Aerospace and Electronic Systems, vol. 51, No. 3, pp. 2406 - 2419, 2015.

Patents

1. "Conflict Detection and Resolution Using Predicted Aircraft Trajectories". Inventors: I. del Pozo, M.A. Vilaplana, A. Valenzuela, R. Vazquez and D. Rivas. Applicant: The Boeing Company. Reference: US20130317733, EP2667366 A1.

Refereed Conference Papers

1. Rafael Vazquez and M. Krstic, "Volterra Boundary Control Laws for a Class of Nonlinear Parabolic Partial Differential Equations," in Proceeding of the Sixth IFAC Symposium on Nonlinear Control Systems (NOLCOS 2004), Stuttgart, Germany, September 1-3, 2004.
2. F.J. Rubio-Sierra, Rafael Vazquez and R. Stark, "Transfer Function Analysis of Atomic Force Microscope Cantilevers," IMECE2005, Orlando, Florida, 2005.
3. Rafael Vazquez and M. Krstic, "Thermal Convection Loop Control by Continuous Backstepping and Singular Perturbations," Proceedings of the 24th American Control Conference (ACC), Portland, June, 2005.
4. Rafael Vazquez and M. Krstic, "Explicit Feedback Control for a Thermal Convection Loop," Proceedings of the Third M.I.T. Conference on Computational Fluid and Solid Mechanics, June 14 - 17, 2005.
5. Rafael Vazquez and M. Krstic, "A Closed-Form Feedback Controller for Stabilization of Linearized Navier-Stokes Equations: The 2D Poisseuille Flow," to appear, 44th IEEE Conference on Decision and Control (CDC), Sevilla, December, 2005.
6. Rafael Vazquez and M. Krstic, "A Closed-Form Observer for the Channel Flow Navier-Stokes System," to appear, 44th IEEE Conference on Decision and Control (CDC), Sevilla, December, 2005.
7. M. Krstic, A. Smyshlyaev, and R. Vazquez, "Boundary control of PDEs and applications to turbulent flows and flexible structures," 25th Chinese Control Conference, Harbin, China, 2006.
8. Rafael Vazquez, E. Schuster and M. Krstic, "A Closed Form Observer for the 3D Inductionless Hartmann Flow," Conference on Active Flow Control, Berlin, Germany, 2006.
9. Rafael Vazquez, E. Trelat and J.-M. Coron, "Fast Tracking of Poiseuille Trajectories in Navier Stokes 2D Channel Flow," Joint CTS-HYCON workshop, Paris, France, July 2006.
10. Rafael Vazquez and M. Krstic, "Higher Order Stability Properties of a 2D Navier Stokes System with an Explicit Boundary Controller," 25th American Control Conference (ACC), Minneapolis, June, 2006.
11. Rafael Vazquez, J.M. Coron and E. Trelat, "Stable Poiseuille Flow Transfer for a Navier-Stokes System," 25th American Control Conference (ACC), Minneapolis, June, 2006.

12. J. Cochran, Rafael Vazquez and M. Krstic, "Backstepping Boundary Control of Navier-Stokes Channel Flow: A 3D Extension, " 25th American Control Conference (ACC), Minneapolis, June, 2006.
13. Rafael Vazquez, J.R. Rubio-Sierra and R. Stark, "Transfer Function Analysis of a Surface Coupled Atomic Force Microscope Cantilever System," 25th American Control Conference (ACC), Minneapolis, June, 2006.
14. M. Krstic, J. Cochran, and R. Vazquez, "Decoupling and stabilizing Orr-Sommerfield and Squire systems by boundary control," 3rd AIAA Flow Control Conference, 2006.
15. M. Krstic, R. Vazquez, A. Siranosian, and M. Bement, "Sensing schemes for state estimation in turbulent flows and flexible structures," Proceedings of SPIE, Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems, Paper Number: 6174-28, 2006.
16. J. Cochran, Rafael Vazquez, and M. Krstic, "Backstepping Boundary Control of Navier-Stokes Channel Flow: Explicit Gain Formulae in 3D," 45th Conference on Decision and Control (CDC), San Diego, USA, December 2006.
17. Rafael Vazquez, E. Schuster and M. Krstic, "A Closed-Form Observer for the 3D Inductionless MHD and Navier-Stokes Channel Flow," 45th Conference on Decision and Control (CDC), San Diego, USA, December 2006.
18. R. Vazquez, E. Schuster, and M. Krstic, "A closed-form feedback controller for stabilization of magnetohydrodynamic channel flow," 2007 European Control Conference (ECC), Kos, Greece, 2007.
19. R. Vazquez, and M. Krstic, "Boundary control of nonlinear PDEs by Volterra feedback linearization," 2007 European Control Conference (ECC), Kos, Greece, 2007.
20. R. Vazquez, and M. Krstic, "Explicit output feedback stabilization of a thermal convection loop by continuous backstepping and singular perturbations," 26th American Control Conference (ACC), New York, USA, 2007.
21. C. Xu, E. Schuster, R. Vazquez, and M. Krstic, "Stabilization of linearized 2D magnetohydrodynamic channel flow by backstepping boundary control," 26th American Control Conference (ACC), New York, USA, 2007.
22. R. Vazquez, J. Cochran, O. M. Aamo, and M. Krstic, "Control of channel flow turbulence, vortex shedding, and thermal convection by backstepping boundary control," 26th American Control Conference (ACC), New York, USA, 2007.
23. R. Vazquez, and M. Krstic, "Backstepping Boundary Control of Magnetohydrodynamic Channel Flow," 7th IFAC Symposium on Nonlinear Control Systems (NOLCOS), Pretoria, South Africa, 2007.
24. R. Vazquez, and M. Krstic, "Boundary control laws for parabolic PDEs with Volterra nonlinearities. Part I: Design," 7th IFAC Symposium on Nonlinear Control Systems (NOLCOS, Pretoria, South Africa, 2007.
25. R. Vazquez, and M. Krstic, "Boundary control laws for parabolic PDEs with Volterra nonlinearities. Part II: Examples," 7th IFAC Symposium on Nonlinear Control Systems (NOLCOS, Pretoria, South Africa, 2007.
26. R. Vazquez, and M. Krstic, "Boundary control laws for parabolic PDEs with Volterra nonlinearities. Part III: Analysis," 7th IFAC Symposium on Nonlinear Control Systems (NOLCOS, Pretoria, South Africa, 2007.
27. M. Krstic, A. Smyshlyaev, and R. Vazquez, "Infinite-dimensional backstepping and applications to flows in electromagnetic fields," Mediterranean Control Conference, 2008.
28. M. Krstic, L. Magnis, and R. Vazquez, "Nonlinear control of the Burgers PDE - Part I: Full-state stabilization," American Control Conference, 2008.
29. M. Krstic, L. Magnis, R. Vazquez, "Nonlinear control of the Burgers PDE - Part II: Observer design, trajectory generation, and tracking," American Control Conference, 2008.
30. F. Gavilan, R. Vazquez, E. F. Camacho"Robust Model Predictive Control for Spacecraft Rendezvous with Online Prediction of Disturbance Bounds," AGNFCS'09, Samara, Russia, 2009.
31. F. Gavilan, J. A. Acosta, R. Vazquez, "Control of the longitudinal flight dynamics of an UAV using adaptive backstepping," IFAC World Congress, 2011.
32. R. Vazquez, F. Gavilan, E. F. Camacho, "Trajectory Planning for Spacecraft Rendezvous with On/Off Thrusters," IFAC World Congress, 2011.
33. R. Vazquez, D. Rivas, "Propagation of Initial Mass Uncertainty in Aircraft Cruise Flight ," 11th AIAA Aviation Technology, Integration, and Operations (ATIO) Conference, 2011.
34. J. Galan, R. Vazquez, E. Carrizosa, C. V. Flores, F. Perea, F. M. Crespo, "Towards a visual tool for swath acquisition planning in multiple-mission EOSs," 7th International Workshop on Planning and Scheduling for Space IWPSS-11, 2011.

35. F. Gavilan, R. Vazquez, J. A. Acosta, "Output-Feedback Control of the Longitudinal Flight Dynamics Using Adaptative Backstepping," 2011 CDC/ECC, Orlando, Florida, 2011.
36. R. Vazquez, M. Krstic, J.-M. Coron, "Backstepping Boundary Stabilization and State Estimation of a 2 X 2 Linear Hyperbolic System," 2011 CDC/ECC, Orlando, Florida, 2011.
37. R. Vazquez, J.-M. Coron, M. Krstic, G. Bastin, "Local Exponential H2 Stabilization of a 2 X 2 Quasilinear Hyperbolic System using Backstepping," 2011 CDC/ECC, Orlando, Florida, 2011.
38. F. Gavilan, R. Vazquez, J. A. Acosta, "Adaptive Control of Airplane Longitudinal Flight Dynamics," RED-UAS 2011, Seville, Spain, 2011.
39. R. Vazquez, J.-M. Coron, M. Krstic, G. Bastin, "Collocated Output-Feedback Stabilization of a 2 X 2 Quasilinear Hyperbolic System using Backstepping," 2012 ACC, 2012.
40. F. Di Meglio, M. Krstic, R. Vazquez, N. Petit, "Backstepping stabilization of an underactuated 3 X 3 linear hyperbolic system of fluid flow transport equations," 2012 ACC, 2012.
41. A Valenzuela, D Rivas, R Vazquez, I del Pozo, M Vilaplana, "Conflict Resolution with Time Constraints in Trajectory-Based Arrival Management," Schaefer, Dirk (Editor) Proceedings of the 2nd SESAR Innovation Days (2012) EUROCONTROL. ISBN 978-2-87497-068-9.
42. F. Di Meglio, R. Vazquez, and M. Krstic, "Stabilization of a linear hyperbolic system with one boundary controlled transport PDE coupled with n counterconvecting PDEs," Proceedings of the 2012 IEEE Conference on Decision and Control, 2012.
43. F. Di Meglio, R. Vazquez, and M. Krstic, "A backstepping boundary observer for a class of linear first-order hyperbolic systems," accepted, 2013 European Control Conference, 2013.
44. R. Vazquez, and M. Krstic, "Marcum Q-functions and Explicit Feedback Laws for Stabilization of Constant Coefficient 2 x 2 Linear Hyperbolic Systems," accepted, 2013 IEEE Conference on Decision and Control, 2013.
45. R. Vazquez and M. Krstic, "Explicit boundary control of a reaction-diffusion equation on a disk," IFAC World Congress, 2014.
46. R. Vazquez, F. Gavilan, and E.F. Camacho, "Trajectory Planning for Spacecraft Rendezvous in Elliptical Orbits with On/Off Thrusters," IFAC World Congress, 2014.
47. M. Rodriguez-Lubian and R. Vazquez, "Spacecraft Attitude Determination and Control System for an Earth Observation Satellite," 10th AIAA-Pegasus student conference, 2014.
48. I. Librero-Jimenez and R. Vazquez, "Satellite Station scheduling through a Mixed Integer Linear Programming Algorithm optimization approach," 10th AIAA-Pegasus student conference, 2014.
49. R. Vazquez and M. Krstic, "Explicit boundary control of reaction-diffusion PDEs on arbitrary-dimensonal balls," 2015 European Control Conference.
50. F. Gavilan, R. Vazquez, E. F. Camacho, "A High-Level Model Predictive Control Guidance Law for Unmanned Aerial Vehicles," 2015 European Control Conference.
51. R. Vazquez, F. Gavilan, and E.F. Camacho, "Model Predictive Control for Spacecraft Rendezvous in Elliptical Orbits with On/Off Thrusters," Advanced Control and Navigation of Autonomous Aerospace Vehicles (ACNAAV'15), 2015.
52. F. Gavilan, R. Vazquez, and S. Esteban, "Trajectory tracking for fixed-wing UAV using model predictive control and adaptive backstepping," Advanced Control and Navigation of Autonomous Aerospace Vehicles (ACNAAV'15), 2015.