Laurent BURLION

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RESEARCH INTERESTS:

My primary research interest is nonlinear control and estimation, from both a theoretical and a practical point of view, with a focus on applications both to industrial aerospace benchmarks or unmanned aerial systems. Recent activity has focused on state constraints and input saturation.

EMPLOYMENT:

Rutgers, the State University of New Jersey, USA **1/2019-present**

Assistant Professor

- PI or co-PI of several research projects funded by the ONR, AFRL or DOE\ARPA-E.
- Advanced Control Laboratory director. Development of new control methods and demonstrations on drone or satellite test benches.

Onera, the French Aerospace Lab, Toulouse, FR **4/2010-12/2018**

Research Scientist:

- led the $ 3 Million VISIOLAND project (VISIOn based control solutions for automatic Landing of aircraft or UAVs),
- worked on many applications to aerospace systems (satellite, civil and combat aircrafts, launchers, UAVs) with many industrial and academic partners such as AIRBUS, DASSAULT Aviation, CNES, ASTRIUM, ESA, LAAS-CNRS, L2S-CNRS,
- developed advanced Backstepping based control laws for control of nonlinear uncertain flexible systems,
- developed a novel control method based on a subtle Output to Input Saturation Transform (OIST) to take into account state constraints in combination with anti-windup loops,
- proposed a novel anti-collision algorithm which was embedded on a fleet of three UAVs,
- developed novel robust anti-windup solutions in presence of a time varying parameter with application to visual servoing,

University of Michigan, Aerospace Engineering, Ann Arbor, MI. **8/2017-8/2018**

Visiting researcher collaborating with Pr. Ilya Kolmanovsky:

- developing advanced reference governors techniques for uncertain systems,
- developing novel very flexible aircraft models and ad hoc reference governors solutions,
- exploring reference governors techniques in presence of nonlinear dynamics or time-varying constraints with application to visual servoing or UAVs in wind gust.

DGA-LRBA, French DoD, Vernon, FR **9/2003-3/2010**

Expert Engineer in guidance and control

- ➢ worked on advanced nonlinear control solutions with industrial such as Airbus Defence and Space, MBDA and SAGEM,
- ➢ was responsible from the road map "Guidance, control and optimization",
- ➢ prepared in parallel a Ph.D. at L2S-CNRS.

EDUCATION:

INP Toulouse, Habilitation (French accreditation to supervise research) **12/2019**

Habilitation Thesis: « *Nonlinear Control and Observation of Aerospace Systems* »,

Committee: T. Ahmed-Ali, J-M. Biannic, S. Caux, F. Cazaurang, B. Clement, I. Fantoni and A. Marcos.

University of Paris Saclay, L2S-CNRS, Ph.D., Physics **9/2003-2/2007**

Thesis: « *Contribution to design and analysis of nonlinear sampled-data control systems* »,

Committee: A. Astolfi, C. Moog, C. Prieur, J. Daafouz, T. Ahmed-Ali, F. Lamnabhi-Lagarrigue.

Ecole Centrale Nantes, M.S., Control Engineering **9/2003**

Ensta Bretagne (former Ensieta), Engineering Degree **9/2003**

TEACHING:

- Special topic: Drones II: control and coordination (Spring 2021, Spring 22), Rutgers-MAE 606.
- Advanced Control I (Fall 2020, Fall 2022), Rutgers-MAE 504.
- Aircraft flight Dynamics (Spring 2019, Spring 2020), Rutgers-MAE 471.
- Vehicles Dynamics (Fall 2019, Fall 2021), Rutgers-MAE 451.
- Introduction to linear control systems (Fall 2014, Fall 2015, Fall 2016)

  Tutoring, Isae Supaero, 2nd year (equiv. MSc 1st year).

- *Linear filtering and signal processing (Fall 2014, Fall 2015, Fall 2016)*

  Tutoring, Isae Supaero, 2nd year (equiv. MSc 1st year).

- *Introduction to flight dynamics (Spring 2014, Spring 2015)*

  Tutoring, Isae Supaero, 2nd year (equiv. MSc 1st year).

- *Kalman filtering (Fall 2013, Fall 2014, Fall 2015, Fall 2016)*

  Tutoring, Enseeiht, 3rd year (equiv. MSc 2nd year).

- *Mathematical analysis (Spring 2012, Fall 2012)*

  Tutoring University Paul Sabatier, Toulouse, L1 (equiv. Undergraduate 1st year).

STUDENT SUPERVISION:

Doctoral Theses, main or co-advisor:

[1] G. Sabiron, "Design of a GNC Solution based on Bio-Inspired Optic Flow Sensors adapted to low speed measurement for an Autonomous Soft Lunar Landing", PhD, 2014.

External funding: ESA, Airbus Defence and Space.

[2] E. Duraffourg, "Nonlinear control with flexible modes, aerospace applications", PhD, 2014.

[3] V. Gibert, "Observability analysis and robust nonlinear observers design for vision-based landing of a transport aircraft on an unknown runway", PhD, 2016.

External funding: Airbus.

[4] E. Chambon, "Frequency and time-domain constrained control of linear systems. Application to a flexible launch vehicle", PhD, 2016.

[5] T. Cunis, "Modeling, Analysis, and Control for Upset Recovery - from System Theory to Unmanned Aircraft Flight", PhD, 2019.

[6] A. Bourdelle, "Attitude control of a satellite in presence of sloshing", PhD 2021.

External funding: French Space Agency “Cnes”.

[7] C. Zhao, PhD candidate, in progress.

[8] R. Schieni, PhD candidate, in progress.

[9] J. Lopez Muro, PhD candidate, in progress.

[10] M. Fogel, PhD candidate, in progress

[11] J. Barreira, PhD candidate, in progress

Postdoctoral researcher, main or co-advisor:

[1] C. Chauffaut, 2015.

[2] R. Hamrah, 2021.

[3] X. Du, 2020-2021.

[4] M. Maadani, 2021-2022.

Master Theses, supervisor:

[1] N. Jacob, M.S, "Nonlinear model predictive control of a missile", 2007.

[2] M. Archen, M.S, "Control of large scale uncertain nonlinear flexible systems", 2011.

[3] D. Hernandez, M.S, "Transportation of cable suspended load using two rotary wing UAVs”, 2012.

[4] E. Chambon, M.S, "Nonlinear energy-based control method for fixed wing UAV automatic landing", 2013.

[5] B. Espivent, M.S, "Vision based automatic landing of a fixed wing UAV", 2014.

[6] D. Sutton, M.Eng, “Small Quadcopters & Advanced Control: dynamic thrust stand“, 2021.

[7] J. Barreira, M. Eng, “Simultaneous and autonomous control of multiple quadcopters from Matlab”, 2021.

[8] M. Fogel, M.S, “Applying Machine Learning to the Satellite Sloshing Problem”, 2022.

[9] J. Brennan, M. Eng, in progress.

[10] M. Abdalla, M.Eng, in progress.

[11] K. Leiton, M. Eng, in progress.

[12] M. Jadeja, M.S, in progress.

Graduate projects, supervisor:

[1] S. Duverger and.C. Issanchou "Modeling and nonlinear control of an automated wind kite", 2014.

[2] A. El-Mourabit and B. Pontin, *"Virtual constraints for kite-based systems control*", 2014.

JOURNAL PAPERS (* INDICATES MY STUDENTS)

[J31] L. Burlion, R. Schieni* and I. Kolmanovsky, “*A Reference Governor for linear systems with polynomial constraints*”, Automatica, vol.142, 2022.

[J30] L. Burlion, V. Gibert*, M. Malisoff and F. Mazenc, *“Controls for a nonlinear system arising in vision-based landing of airliners”*, International Journal of Robust and Nonlinear Control, vol 31(4), pp.1227-1244, 2021.

[J29] I. Rubio Scola, G. Guijarro Reyes, L. Garcia Carrillo, J. Hespanha and L. Burlion, “*A Robust Control Strategy with Perturbation Estimation for the Parrot Mambo Platform*”, IEEE Trans. on Control Systems Technology, vol. 29(4), pp.1389-1404, 2021.

[J28] T. Cunis*, J-P. Condomines, and L. Burlion, "*Stability and control synthesis for deep-stall recovery using sum-of-square*", AIAA Journal of Guidance, Control and Dynamics, vol. 43(8), pp.1498-1511, 2020.

[J27] T. Cunis*, J-P. Condomines, and L. Burlion, "*Local stability analysis for large polynomial spline systems*", Automatica, vol.113, 2020.

[J26] L. Burlion, M. Malisoff, F. Mazenc, “*Stabilization and Robustness Analysis of Saturating Integrators arising in Vision Based Landing of Aircraft with Sampling*”, Systems & Control Letters, vol 135, 2020.

[J25] T. Cunis*, J-P. Condomines, L. Burlion and A. La Cour-Harbo, "*Dynamic stability analysis of aircraft flight in deep stall*", AIAA Journal of Aircraft, vol. 57(1), pp. 143-155, 2020.

[J24] M.M. Nicotra, D. Liao-McPherson, L. Burlion and I.V. Kolmanovsky, *"Spacecraft Attitude Control with Nonconvex Constraints: An Explicit Reference Governor Approach",* IEEE Trans. on Automatic Control, vol 65(8), pp. 3677-3684, 2020.

[J23] T. Ahmed-Ali, E. Fridman, F. Giri, M. Kahelras, F. Lamnabhi-Lagarrigue and L. Burlion, "*Observer design for a class of parabolic systems with large delays and*

sampled measurements", IEEE Trans. on Automatic Control, vol.65(5), pp.2200-2206, 2020.

[J22] L. Burlion, L. Zaccarian, H. de Plinval and S. Tarbouriech, "*Discontinuous model recovery anti-windup for image based visual servoing*", Automatica, vol.104, pp.41-47, 2019.

[J21] F. Mazenc, L. Burlion and M. Malisoff, "*Backstepping design for output feedback stabilization for a class of uncertain systems*", Systems & Control Letters, vol.123, pp.134-143, 2019.

[J20] F. Mazenc, L. Burlion and M. Malisoff, "*Stabilization and robustness analysis for a chain of saturating integrators with imprecise measurements*", IEEE Control Systems Letters, vol.3(2), 2019.

[J19] T. Cunis*, L. Burlion and J-P. Condomines, "*On Piece-wise Polynomial Modeling for Control and Analysis of Aircraft Dynamics beyond Stall*", AIAA Journal of Guidance, Control and Dynamics, vol.42(4), pp. 949-957, 2019.

[J18] L. Burlion, J-M. Biannic and T. Ahmed-Ali, "*Attitude tracking of a flexible spacecraft under angular velocity constraints*", International Journal of Control, vol.92(7), pp. 1524-1540, 2019.

[J17] V. Gibert*, F. Plestan, L. Burlion, J.Boada and A. Chriette, "*New scheme for visual estimation of deviations based on sliding mode and high gain approaches: application to the landing of a civil aircraft*", Control Engineering Practice, vol.75, pp.17-25, 2018.

[J16] F. Mazenc, M. Malisoff, L. Burlion and J. Weston, "*Bounded Backstepping Control and Robustness Analysis for Time-Varying Systems under Converging-Input-Converging-State Conditions*", European Journal of Control, vol.42, pp.15-24, 2018.

[J15] T. Ahmed-Ali, F. Giri, M. Krstic, L. Burlion and F. Lamnabhi-Lagarrigue, "*Adaptive Observers design in presence of heat PDE sensor*", Automatica, vol.82, pp. 93-100, 2017.

[J14] E. Chambon*, L. Burlion and P. Apkarian, "*Time-response shaping using Output to Input Saturation Transformation*", International Journal of Control, vol. 91(3), pp.534-553, 2018.

[J13] P. Bidaud, L. Burlion, H. de Plinval, T. Loquen, J. Marzat and C. Pralet, "*Dealing with complexity through advanced control techniques*", in a special issue celebrating the 70th birthday of ONERA, Vol.12(13), AL12-13 (the electronic Journal of Onera, on-line accessible), 2016.

[J12] E. Chambon*, L. Burlion and P. Apkarian, "*Détermination de matrice semblable Metzler par optimisation non lisse*", JESA, European Journal of Automation, vol.50, pp.75-94, 2017.

[J11] E. Duraffourg*, L. Burlion and T. Ahmed-Ali, "*Finite-time observer based Backstepping control of a flexible launch vehicle*", Journal of Vibration and Control, (published online 09-2016), vol. 24(2), pp. 1535-1550, 2018.

[J10] T. Ahmed-Ali, F. Giri, M. Krstic, L. Burlion and F. Lamnabhi-Lagarrigue, "*Adaptive Boundary Observer for Parabolic PDEs subject to Domain and Boundary Parameter Uncertainties*", Automatica, vol.72, pp 115-122, 2016.

[J9] T. Ahmed-Ali, E. Fridman, F. Giri, L. Burlion and F. Lamnabhi-Lagarrigue, "*Using exponential time-varying gains for sampled-data stabilization and estimation*", Automatica, vol.67, pp 244-251, 2016.

[J8] E. Chambon*, L. Burlion and P. Apkarian, "*A Nonsmooth Optimization-based Approach to Interval Observers Design*", in IET Control Theory & Applications, vol. 10, no. 11, pp. 1258-1268, 2016.

[J7] T. Folin, T. Ahmed-Ali, F. Giri, L. Burlion and F. Lamnabhi-Lagarrigue, "*Sampled-Data Adaptive Observer for a Class of State-Affine Output-Injection Nonlinear Systems*", in IEEE Trans. on Automatic Control, vol. 61(2), pp.462-467, 2016

[J6] T Ahmed-Ali, F. Giri, M. Krstic, F. Lamnabhi-Lagarrigue and L. Burlion, "*Adaptive observer for a class of parabolic PDEs*", in IEEE Trans. on Automatic Control, vol.61(10), pp.3083-3090, 2016.

[J5] G. Sabiron*, T. Raharijaona, L. Burlion, E. Kervendal, E. Bornschlegl and F. Ruffier, "*Sub-optimal Lunar Landing GNC using Non-Gimbaled Optic Flow Sensors*", in IEEE Trans. on Aerospace and Electronic Systems, vol. 51 (4), pp.2525-2545, 2015.

[J4] J.M. Biannic, L. Burlion and H. de Plinval, "*Robust control design over large flight envelopes: a promising approach for aerial robotics*", in a special issue of the Aerospace Lab Journal on Aerial Robotics, Vol.8(1), AL8-01 (the electronic Journal of Onera, on-line accessible), 2014.

[J3] R. Postoyan, T. Ahmed-Ali, L. Burlion, F. Lamnabhi-Lagarrigue, "*On the Lyapunov-based adaptive control redesign for a class of nonlinear sampled-data systems*", Automatica, vol.44(8), pp 2099-2107, 2008.

[J2] L. Burlion, T. Ahmed-Ali and F. Lamnabhi-Lagarrigue, "*On the stability of a class of nonlinear hybrid systems*", Nonlinear Analysis: Theory, Methods and Applications, vol.65(12), 2236-2247, 2006.

[J1] L. Burlion, T. Ahmed-Ali and F. Lamnabhi-Lagarrigue, "*On the stabilization of sampled-data nonlinear systems by using backstepping on the higher order approximate models*", International Journal of Control, vol.79(9), 1087-1095, 2006.

BOOK CHAPTERS

[B1] E. Chambon*, P. Apkarian and L. Burlion*, "Flexible launch vehicle control using robust observer-based controller obtained through structured H∞ synthesis",* in "Advances in Aerospace Guidance Navigation and Control: selected papers of the 3rd CEAS Specialist Conference on Guidance, Navigation and Control", Springer, pp.23-38, 2015.

[B2] H. de Plinval and L. Burlion, "*Nonlinear visual servoing control for VTOL UAVs with field of view constraint*", in "Advances in Aerospace Guidance Navigation and Control: selected papers of the 3rd CEAS Specialist Conference on Guidance, Navigation and Control", Springer, pp.531-548, 2015.

[B3] V. Gibert*, L. Burlion, A. Chriette, J. Boada and F. Plestan, "*A new observer for range identification in perspective vision systems*", in "Advances in Aerospace Guidance Navigation and Control: selected papers of the 3rd CEAS Specialist Conference on Guidance, Navigation and Control", Springer, pp.401-414, 2015.

[B4] G. Sabiron*, P. Chavent, L. Burlion, E. Kervendal, P. Fabiani, T. Raharijaona and F. Ruffier, "*Toward an autonomous lunar landing based on low-speed optic flow sensors*", in "Advances in Aerospace Guidance Navigation and Control: selected papers of the 2nd CEAS Specialist Conference on Guidance, Navigation and Control", Springer, pp.681-699, 2013.

CONFERENCE PUBLICATIONS

[C64] G. Magnani, J-M. Biannic, M. Cassaro, H. Evain and L. Burlion, "*Reference Governor Based Solution for Satellite Attitude Control with Sloshing and Actuation Constraints*", accepted to EUCASS 2022.

[C63] M. Simsek, R. Schieni*, L. Burlion and O. Bilgen, "A Hybrid Position Feedback Controlled Bistable Metamaterial Concept", ENOC 2020: 10th European Nonlinear Dynamics Conference, accepted.

[C62] C. Zhao*, M. Fogel* and L. Burlion, "Control of propellant slosh dynamics in observation spacecraft using Model Free Control and pressure sensors", accepted to the IEEE CCTA conference, Trieste, 2022.

[C61] R. Schieni* and L. Burlion, "A Reference Governor for Control of Bistable Structures with Polynomial Constraints", accepted to the IEEE CCTA conference, Trieste, 2022.

[C60] J. López Muro, X. Du, J-P. Condomines, O. Bilgen and L. Burlion, accepted to "Wind Turbine Tower Thickness and Blade Pitch Control Co-Design Optimization", in Proc. of the AIAA Scitech Forum, 2022.

[C59] M. Higgins* and L. Burlion, "Implementation of a Learning-Based Explicit Reference Governor for Constrained Control of a UAV", in Proc. of the AIAA Scitech Forum, 2022.

[C58] R. Schieni*, M. Simsek, T. Cunis, O. Bilgen and L. Burlion, "Control of Bistable Structures Using a Modified Hybrid Position Feedback Controller", in Proc. of the AIAA Scitech Forum, 2022.

[C57] B. Lai*, T. Cunis and L. Burlion, "*Nonlinear Trajectory Based Region of Attraction Estimation for Aircraft Dynamics Analysis*", in Proc. of the AIAA Scitech Forum, 2021.

[C56] X. Du*, L. Burlion and O. Bilgen, "*Control co–design for rotor blades of floating offshore wind turbines*", ASME IMECE 2020.

[C55] T. Cunis*, D. Liao-MacPherson, I. Kolmanovsky and L. Burlion, " *Model-Predictive Spiral and Spin Upset Recovery Control for the Generic Transport Model Simulation*", in Prof. of the IEEE CCTA conference, 2020.

[C54] L. Burlion and I. Kolmanovsky, "*Vision based Landing of an Aircraft using Robust Extended Command Governors*", in Prof. of the 2020 IFAC World Congress.

[C53] T. Cunis*, D. Liao-MacPherson, J-P Condomines, L Burlion, I. Kolmanovsky, "*Economic Model Predictive Control Strategies for Aircraft Deep-stall Recovery with Stability Guarantees*", in proc. of the 58th IEEE Conference on Decision and Control, (CDC 2019).

[C52] L. Burlion, M. Malisoff and M. Mazenc, "*Stabilization and robustness analysis for a chain of saturating integrators arising in the visual landing of aircraft*", in Proc. of the 58th IEEE Conference on Decision and Control, (CDC 2019).

[C51] J.-M. Biannic, A. Bourdelle*, H. Evain, S. Moreno and L. Burlion, "*On robust LPV-based observation of fuel slosh dynamics for attitude control design*", in Proc. of the 3rd IFAC Workshop on Linear Parameter Varying Systems, (LPVS 2019), vol.52(28), pp. 170-175, 2019.

[C50] A. Bourdelle*, J-M. Biannic, H. Evain, C. Pittet, S. Moreno and L. Burlion, *"Modeling and control of propellant slosh dynamics in observation spacecraft"*, in Proc. of the 8th European Conference for Aeronautics and Space Sciences, (EUCASS 2019), Madrid, Spain, (Best Student Paper Award in Flight Dynamics, GNC and Avionics).

[C49] A. Bourdelle*, J-M. Biannic, S. Moreno, C. Pittet and L. Burlion, *"Propellant sloshing torque H∞-based observer design for enhanced attitude control",* in Proc. of the 21st IFAC Symposium on Automatic Control in Aerospace, (ACA 2019), vol.52(12), pp. 286-291, 2019.

[C48] A. Bourdelle*, L. Burlion, J-M. Biannic, S. Moreno and C. Pittet, *"Towards new control design oriented models for fuel sloshing in observation spacecraft"*, AIAA SciTech 2019 Forum, San Diego, CA, 2019.

[C47] L. Burlion, M. Nicotra and I. Kolmanovsky, "*A fast reference governor for the constrained control of linear discrete-time systems with parametric uncertainties*", in Proc. of the 57th IEEE Conference on Decision and Control, (CDC 2018), pp. 6289-6294, 2018.

[C46] F. Mazenc, L. Burlion and V. Gibert*, "*Stabilization of a nonlinear system that arises in the context of vision based landing of an airliner*", in Proc. of the 57th IEEE Conference on Decision and Control, (CDC 2018), pp. 5313-5318, 2018.

[C45] T. Ahmed-Ali, E. Fridman, F. Giri, M. Kahelras, F. Lamnabhi-Lagarrigue and L. Burlion, "*Observer design for a class of parabolic systems with arbitrarily delayed measurements*", in Proc. of the 57th IEEE Conference on Decision and Control, (CDC 2018), pp. 2199-2204, 2018.

[C44] J-M. Biannic, L. Burlion and S. Tarbouriech, *"Finite time LPV analysis of vision based landing system with Anti-Windup augmentation"*, in Proc. of the 2nd IFAC Workshop on Linear Parameter Varying Systems, (LPVS'18), vol. 51(26), pp.37-42, 2018.

[C43] F. Mazenc, L. Burlion and M. Malisoff, "*Backstepping design for output feedback stabilization for uncertain systems using dynamic extension*", in Proc. of the 2nd IFAC Conference on Modelling, Identification and Control of Nonlinear Systems, (MICNON 2018), pp.260-265, 2018.

[C42] F. Mazenc, L. Burlion and V. Gibert*, "*Stabilization of a system that arises in the context of vision based landing of a civil aircraft*", in Proc. of the annual American Control Conference, (ACC 2018), pp. 2978-2983, 2018.

[C41] T. Cunis*, L. Burlion and J-P.Condomines, "*Piece-wise Identification and Analysis of the Aerodynamic Coefficients, Trim Conditions, and Safe Sets of the Generic Transport Model*", AIAA SciTech 2018 Forum, Kissimmee, FL, January 2018.

[C40] F. Mazenc, M. Malisoff and L. Burlion, "*Bounded backstepping through a dynamic extension with delay*", in Proc. of the 56th IEEE Conference on Decision and Control, (CDC 2017), pp.4351-4356, 2017.

[C39] J-M. Biannic and L. Burlion, "*Performance analysis of saturated parameter-varying systems with application to vision-based landing assessment*", in Proc of the 20th IFAC World Congress, pp.10513-10517, 2017.

[C38] L. Burlion and H. de Plinval, "*Vision based anti-windup design with application to the landing of an airliner*", in Proc of the 20th IFAC World Congress, pp.10482-10487, 2017.

[C37] C. Chauffaut*, L. Burlion, F. Defay and H. de Plinval, "*Collision Avoidance of multiple MAVs using a multiple Outputs to Input Saturation Technique*", in Proc of the International Micro Air Vehicle Conference and Competition, (IMAV 2017), pp.190-195, 2017.

[C36] T. Cunis*, J-P. Condomines and L. Burlion, "*Six-degrees-of-freedom trim analysis of unmanned aerial systems based on piecewise polynomial aerodynamic coefficients*", in Proc. of the 2017 Workshop on Research, Education and Development of Unmanned Aerial Systems, (RedUAS 2017), pp. 108-113, 2017.

[C35] L. Burlion and H. de Plinval, "*Toward vision based landing of a fixed-wing UAV on an unknown runway under some FoV constraints*", in Proc of the 2017 International Conference on Unmanned Aircraft Systems, (ICUAS 2017), Miami, Florida, pp. 1824-1832, 2017.

[C34] C. Chauffaut, F Defaÿ, L Burlion and H de Plinval, "*UAV obstacle avoidance scheme using an Output to Input Saturation Transformation technique*", in Proc of the International Conference on Unmanned Aircraft Systems, (ICUAS 2016), pp. 227-234, 2016.

[C33] V. Gibert*, L. Burlion, A. Chriette, J. Boada and F. Plestan, "*Vision based automatic landing of a civil aircraft by using nonlinear pose estimation*", in Proc of the 6th European Conference for Aeronautics and Space Sciences, (EUCASS 2015), Krakow, Poland, 2015.

[C32] E. Chambon*, L. Burlion and P. Apkarian, "*Output to Input Saturation Transformation: Demonstration and Application to Disturbed Linear Systems*", in Proc of the 54th IEEE Conference on Decision and Control, pp.7566-7571, 2015.

[C31] V. Gibert*, L. Burlion, A. Chriette, J. Boada and F. Plestan, "*New pose estimation scheme in perspective vision system during civil aircraft landings*", in Proc of the 11th IFAC Symposium on Robot Control, SYROCO 2015, vol.48(19), pp.238-243, 2015.

[C30] L. Burlion and H. de Plinval, "*Visual landing insensitive to the depth with variable constraints: a twisting based solution*", in Proc. of the.23rd Mediterranean Conference on Control and Automation, MED 2015, pp.603-610, 2015.

[C29] T. Ahmed-Ali, E. Fridman, F. Giri, L. Burlion and F. Lamnabhi-Lagarrigue, "*A new approach to enlarging sampling intervals for some sampled-data systems and observers*", in Proc of the 12th IFAC workshop on Time Delay Systems, IFAC TDS 2015, vol.48(12), pp.440-445, 2015.

[C28] E. Chambon*, P. Apkarian and L. Burlion, "*Metzler matrix transform determination using a non-smooth optimization technique with application to interval observers*", in Proc. of the SIAM conference on Control and Its Applications, SIAM CT 15, pp. 205-211, 2015.

[C27] V. Gibert*, L. Burlion, A. Chriette, J. Boada and F. Plestan, "*Nonlinear observers in vision system: application to civil aircraft vision-based landing*", in Proc. of the European Control Conference, ECC 2015, pp. 1812-1817, 2015.

[C26] T. Ahmed-Ali, F. Giri, M. Krstic, L. Burlion and F. Lamnabhi-Lagarrigue, "*Adaptive observers for parabolic PDEs with uncertain parameter in the boundary condition*", in Proc. of the European Control Conference, ECC 2015, pp. 1337-1342, 2015.

[C25] E. Chambon*, L. Burlion, and P. Apkarian, "*Robust output interval constraint using O/I saturation transformation with application to uncertain linear launch vehicle*", in Proc. of the European Control Conference, ECC 2015, pp. 1796-1801, 2015.

[C24] G. Sabiron*, L. Burlion, E. Kervendal, E. Bornschlegl, T. Raharijaona and F. Ruffier, "*Autonomous Lunar Landing Based on Bio-inspired Visual Motion sensors tested in flight*", in Proc of 9th International ESA Conference on Guidance, Navigation & Control Systems, ESA GNC 2014.

[C23] G. Sabiron*, L. Burlion, T. Raharijaona and F. Ruffier, "*Optic flow-based nonlinear control and optimal guidance for lunar landing*", in proc of IEEE International Conference on Robotics and Biomimetics, ROBIO 2014, pp. 1241-1247, 2014.

[C22] T. Ahmed-Ali, L. Burlion, F. Lamnabhi-Lagarrigue and C. Hann, "*A sampled-data observer with time-varying gain for a class of nonlinear systems with sampled-measurements*", in Proc of the 53rd Conference on Decision and Control, Los Angeles, pp.316-321, 2014.

[C21] L. Burlion, H. de Plinval and P. Mouyon, "*Backstepping based Visual Servoing for Transport Aircraft Automatic Landing*", in Proc. of IEEE Multi conference on Systems and Control, MSC 2014, pp. 1461-1466, 2014.

[C20] G. Sabiron*, L. Burlion, G. Jonniaux, E. Kervendal, E. Bornschlegl, T. Raharijaona, and F. Ruffier, "*Backup State Observer Based on Optic Flow Applied to Lunar Landing*", in Proc of international conference on Intelligent RObot and Systems, IROS 2014, pp. 2325-2332, 2014.

[C19] L. Burlion, C. Poussot-Vassal, P. Vuillemin, M. Leitner and T. Kier, "*Longitudinal manoeuvre load control of a flexible large-scale aircraft*", in Proc of the 19th IFAC World Congress, pp. 3413-3418, 2014.

[C18] E. Duraffourg*, L. Burlion, T. Ahmed-Ali and F. Lamnabhi-Lagarrigue, "*Finite time adaptive observer of a flexible nonlinear model of a launcher*", in Proc of the 19th IFAC World Congress, pp. 546-551, 2014.

[C17] L. Burlion, E. Duraffourg*, T. Ahmed-Ali and F. Lamnabhi-Lagarrigue, "*Global asymptotic stabilization for some nonlinear models of flexible aerospace vehicles*", in Proc of the 52nd Conference on Decision and Control, Florence, pp.4230-4235, 2013.

[C16] E. Duraffourg*, L. Burlion and T. Ahmed-Ali, "*Longitudinal Modeling and Preliminary Control of a Non-linear Flexible Launch Vehicle*", in Proc. of the 11th IFAC International Workshop on Adaptation and Learning in Control and Signal Processing, Caen, pp.209-214, 2013.

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PATENT:

[P1] US Patent 20,160,026,189, "*Method and system for automatic autonomous landing of an aircraft*", J. Boada-Bauxell, V. Gibert, L. Burlion, A. Chriette, F. Plestan.

PROJECTS AND COLLABORATIONS:

In progress

- **Interval Observers for Enhanced Shipboard Landing and Formation Control for Naval Aircraft**

Funded by ONR

- **SPICESAT** (Sloshing Platform for In-Orbit Controller Experimentation

Funded by AFRL\SDL

- **Batteries Sharing for Autonomous Vehicles** (Team Science Initiative Project)

Funded by Rutgers\SOE

Completed

- **ATLANTIS** (Computationally Efficient Atmospheric-Data-Driven Control Co-Design Optimization Framework with Mixed-Fidelity Fluid and Structure Analysis)

Funded by Advanced Research Projects Agency-Energy (ARPA-E). Collaboration with the University of Michigan, BYU, NREL. Period: 01/2020-05/2022.

- **DARETeach (**Drone Arenas-based Remote International Teaching)

Funded by the FACE Foundation. Collaboration with CentraleSupélec. Period: 10/2020-09/2021.

- **CONVEX** (Non-linear control for upset recovery of a fixed-wing MAV)

Funded by Onera. Collaboration with Enac, the French School of Aviation. Period: 09/2016-08/2019.

- **DROPTER** (Drone reconfiguration in the event of unforeseeable situations)

Funded by Onera. Period: 09/2017-12/2018.

- **COSOR** (Orbital robotic systems control)

Funded by Cnes and Onera. Collaboration with Cnes. Period: 09/2016-12/2018.

- **VISIOLAND** (VISIOn based LANDing solutions)

Funded by ANR. Collaboration with Airbus (Flight control department) and Irccyn.
Period: 11/2013-11/2017.

- **R&T CNES: "Adaptive control of a flexible satellite"**

Funded by CNES. Collaboration with Greyc CNRS. Period: 01/2014-12/2014.

- **SMAC** (Systems Modeling Analysis & Control)

Funded by Onera. Period: 01/2012-12/2015.

- **Clean Sky ITD SFWA**

Funded by European Commission. Collaboration with Airbus (Load control department).
Period: 01/2011-12/2013.

- **NICE** (Nonlinear Innovative Control designs and Evaluations)

Funded by European Defence Agency (EDA) Collaboration with Dassault Aviation (Flight control department), LAAS-CNRS and University of Tor Vergata. Period: 04/2010-09/2012.

COMMITTEES:

IFAC TC 7.3 (Aerospace): Member since 2014.

IEEE CSS TCAC (Aerospace Control): Member since 2019.

IEEE RAS TC (Aerial Robotics and Unmanned Aerial Vehicles): Member since 2022.

MEMBERSHIPS:

AIAA Senior Member

IEEE RAS and CSS Member

EDITORIAL BOARDS

Frontiers in Intelligent Aerospace Systems: review editor since 2022.

Associate editor for the conferences "Ubiquitous Robotics" 2020 and 2021.

Member of the IPC (international Program Committee) for the IFAC Automatic Control in Aerospace (ACA) 2022

Member of the IEEE CSS Technology Conferences Editorial Board, IEEE CCTA 2022

PRIZES AND AWARDS

2021 Rutgers Provost Award for "Excellence in Teaching Innovations"