

**Taous Meriem LALEG**  
King Abdullah University of Science and Technology  
(KAUST), Thuwal, KSA  
Office: +966128080371, Mobile: +966544701840  
E-mail: taousmeriem.laleg@kaust.edu.sa  
Website: <http://emang.kaust.edu.sa>

## EDUCATION

- INRIA / Versailles University, Paris, France** 2005 - 2008  
Ph.D. in Applied Mathematics  
Dissertation title : Signal analysis based on semi-classical quantization.  
Application to arterial blood pressure analysis  
Key words: signal analysis, Schrödinger operator, semi-classical,  
inverse scattering transforms, estimation, solitons, arterial blood  
pressure  
Advisor: Michel Sorine, INRIA Senior research fellow
- INRIA/ Paris 11 University, Paris, France** 2004 - 2005  
MSc in control systems and signal processing  
**1<sup>st</sup> ranked**  
Dissertation title : Identification of a vascular compartment and  
characteristics of aortic pressure and flow  
Key words: Modeling, identification and identifiability, solitons  
arterial blood pressure, Korteweg-de Vries equation
- National Polytechnic School of Algiers, Algeria** June 2004  
B.S. in Engineering, control systems  
**1<sup>st</sup> ranked**

## PROFESSIONAL EXPERIENCE

- 2011 - Present      Assistant Professor, King Abdullah University of Science and Technology  
(KAUST), KSA  
Computer, Electrical and Mathematical Sciences and Engineering division  
Principal Investigator of Estimation, Modeling and ANalysis (EMAN) group
- 2009 - 2010      INRIA Researcher, INRIA Bordeaux, Sud-Ouest, France
- 2008 - 2009      Postdoctoral Fellow, INRIA Bordeaux, Sud-Ouest, France

## RESEARCHER ID NUMBER

ORCID	0000 - 0001- 5944-0121
Web of Science Researcher ID	H-7316-2016
Scopus ID	36154679600

## HONORS AND SCHOLARLY AWARDS

- Elevated as IEEE senior member, 2015
- Best paper award, IEEE International Conference on Control Engineering and Information Technology 2015 (with my Ph.D student M. Usman Majeed)
- French assistant professor qualification, Applied Mathematics and Control sections, 2009
- Best poster award, MATHMOD conference, Vienna, Austria, February 2006
- INRIA Graduate Fellow, 2005 - 2008
- Honored by the Algerian president for the best national academic performance in 2004

## PROFESSIONAL AFFILIATIONS

- IEEE Control Theory Society
- International Federation of Automatic Control (IFAC) affiliate
- IEEE Signal Processing Society
- IEEE Biomedical Engineering Society
- Society for Industrial and Applied Mathematics (SIAM)

## PUBLICATIONS

Since I have joined KAUST I published 24 papers in peer-reviewed journal articles of which 18 were the outcome of work generated by students and post-docs I supervised. I also published 2 book chapters and 79 conference proceedings with students and post-docs I supervised.

Book Chapters (Students or post-doc advisees are underlined)

- [B1] **Taous Meriem Laleg-Kirati**, Zehor Belkhatir, Fernando Diaz Ledezma. *Application of hybrid dynamical theory to the cardiovascular system*. In Hybrid Dynamical Systems: Control and Observation. Editors : M. Djemai and M. Defoort, springer, 2014.
- [B2] Sharefa Asiri and **Taous-Meriem Laleg-Kirati**, *Wave Velocity Estimation in Heterogeneous Media*. Chapter 21. In Heidelberg Proceedings Volume entitled "Intelligent Mathematics II: Applied Mathematics and Approximation Theory - Contributions from AMAT 2015". pp: 297 - 306.

Peer Reviewed Journals (\* corresponding author. Students or post-doc advisees are underlined)

### Publications after joining KAUST

- [J1] Z. Belkhatir, **T.M. Laleg-Kirati\***, "*High-order sliding mode observer for fractional commensurate linear systems with unknown input*". Accepted for publication in Automatica.
- [J2] S. Elmetennani, **T.M. Laleg-Kirati**, "*Bilinear approximate model based robust Lyapunov control for parabolic distributed collectors*". Accepted for publication in IEEE Transactions on Control Systems Technology.
- [J3] B. Zambri, R. Djellouli\* and **T.M. Laleg-Kirati** "*An efficient multi-stage algorithm for full calibration of the hemodynamic model from BOLD signal responses*". Accepted for publication in International Journal for Numerical Methods in Biomedical Engineering.

- [J4] S. Elmetennani\*, **T.M. Laleg-Kirati**, M. Djemai and M. Tadjine, "New MPPT Technique for Photovoltaic Applications based on Hybrid Dynamical Approach. *Journal of Process Control*, , Vol. 48, pp. 14-24, 2016.
- [J5] S. Asiri and **T.M. Laleg-Kirati**\*, "Modulating Functions-Based Method for Parameters and Source Estimation in One- Dimensional Partial Differential Equations". Accepted for publication in *Inverse Problem in Science and Engineering*.
- [J6] F.Eleiwi, **T.M. Laleg-Kirati**\*, "Nonlinear Observer-based Lyapunov Boundary Control of Distributed Heat Transfer Mechanisms for Membrane Distillation Plants". *Journal of Process Control*, Vol. 47, pp. 78–86, 2016.
- [J7] Ayman Karam and **T.M. Laleg-Kirati**\*, "Electrical Thermal Network for Direct Contact Membrane Distillation Modeling and Analysis". *Journal of Process Control*, Vol. 47, pp. 87–97, 2016.
- [J8] **T.M. Laleg-Kirati**, J. Zhang, E. Achten, H. Serrai, "Spectral data de-noising using Semi Classical Signal Analysis method: Application to Localized Magnetic Resonance Spectroscopy". *NMR in Biomedecine Journal*, Vol. 29, pp. 1477–1485, 2016.
- [J9] A. Aldoghaither, **T.M. Laleg-Kirati**\*, and D.Y. Liu, "Direct and Inverse Source Problem for a Space Fractional Advection Dispersion Equation". *Journal of Inverse and Ill-posed Problems*. ISSN (Online) 1569-3945, ISSN (Print) 0928-0219, DOI: 10.1515/jiip-2015-0037, May 2016.
- [J10] A. M. Karam, A. Alsaadi, N. Ghaffour, and **T. M. Laleg-Kirati**\*, "Analysis of Direct Contact Membrane Distillation Based on a Lumped-Parameter Dynamic Predictive Model". *Desalination Journal*, Vol. 402, pp. 50–61.
- [J11] I. N'Doye\*, **T.M. Laleg-Kirati**, M. Darouach and H. Voos "H-infinity adaptive observer design for a class of nonlinear fractional-order systems". Accepted for publication in the *International Journal of Adaptive Control and Signal Processing*, 2016.
- [J12] S. Elmetennani\*, **T.M. Laleg-Kirati**\*, "Bilinear reduced order approximate model of parabolic distributed solar collectors". *Solar Energy Journal*, Vol. 131, pp. 71–80 June 2016.
- [J13] N. Khoram, C. Zayane, R. Djellouli\*, and **T.M. Laleg-Kirati**, "A novel approach to calibrate the Hemodynamic Model using functional Magnetic Resonance Imaging (fMRI) measurements". *Journal of Neuroscience Method*, Vol. 262, pp. 93 –109, 2016
- [J14] F. Eleiwi, A. Al Saadi, L. Francis, N. Ghaffour, **T.M. Laleg-Kirati**\*, "Dynamic modeling and experimental validation for a Direct-Contact Membrane Distillation (DCMD) process". *Desalination Journal*, Vol. 384, pp. 1–11, 2016.
- [J15] D.Y. Liu, O. GIBARU, W. Perruquetti and **T.M. Laleg-Kirati**, "Fractional order differentiation by integration and error analysis in noisy environment". *IEEE Transactions on Automatic Control*, Vol. 60, No. 11, pp. 2945–2960, 2015.
- [J16] A. Aldoghaither, D.Y. Liu and **T.M. Laleg-Kirati**\*, "A Novel Approach for Parameter and Differentiation Order Estimation for a Space Fractional Advection Dispersion Equation". *SIAM Scientific Computing Journal*, Vol. 37, No. 6, pp. A2813–A2839, 2015.
- [J17] S. Asiri, C. Zayane-Aissa and **T.M. Laleg-Kirati**\*, "An adaptive observer-based algorithm for solving inverse source problem for the wave equation". *Mathematical Problems in Engineering Journal*, Vol. 2015, Article ID 796539.
- [J18] D-Yan Liu\*, Yang Tian, Driss Boutat, **T.M. Laleg-Kirati**, "An algebraic fractional order differentiator for a class of signals satisfying a linear differential equation". *Signal Processing Journal*, Vol. 116, pp. 78–90, 2015.
- [J19] C. Zayane-Aissa and **T.M. Laleg-Kirati**\*, "fMRI nonlinear hemodynamic balloon model: a sensitivity study". *Computational & Mathematical Methods in Medicine*, Vol. 2015, Article ID 425475.
- [J20] Z. Kaiserli, **T.M. Laleg-Kirati**\* and A. Lahmar-Benbernou, "Image reconstruction using squared eigenfunctions of the Schrödinger operator". *Digital Signal Processing Journal*, Vol. 40, pp. 80–87, 2015.

- [J21] M.D. Ortigueira\*, **T.M. Laleg-Kirati** and J.A.T. Machado, "*Reisz Potential versus Fractional Laplacian*". Journal of Statistical Mechanics: Theory and Experiments P09032, 2014.
- [J22] A.M. Karam, **T.M. Laleg-Kirati**\*, C. Zayane-Aissa and N. Kashou, "*Nonlinear Neural Network for Hemodynamic Model State and Input Estimation Using fMRI Data*". Biomedical Signal Processing and Control Journal, Vol. 14, pp. 240–247, 2014.
- [J23] D.Y. Liu\* and **T.M. Laleg-Kirati**\*, "*Robust fractional order differentiators using generalized modulating functions method*". Signal Processing Journal, Vol. 107, pp. 395–406, 2015.
- [J24] R. Djellouli\*, S. Mahserejian, A. Mokrane, M.Moussaoui, **T.M. Laleg-Kirati**, "*Theoretical study of the fibrous capsule tissue growth around a disk-shaped Implant*". Journal of Mathematical Biology, Vol. 67(4), pp. 833–867, 2013.

### Publications before joining KAUST

- [J25] **T.M. Laleg-Kirati**\*, E. Crépeau and M. Sorine. "*Semi-classical signal analysis*". Mathematics of Control, Signals, and Systems (MCSS) Journal, Vol. 25, Issue 1, pp. 37–61, 2013.
- [J26] B. Helffer and **T.M. Laleg-Kirati**\*, "*On semi-classical questions related to signal analysis*". Asymptotic Analysis Journal, Vol. 75, Number 3-4, pp. 125–144, 2011.
- [J27] **T.M. Laleg-Kirati**\*, C. Médigue, Y. Papelier, F. Cottin and A. Van de Louw, "*Validation of a semi-classical signal analysis method for stroke volume variation assessment: a comparison with the PiCCO technique*". Annals of Biomedical Engineering, vol. 38(12), pp. 3618–3629, 2010.
- [J28] **T.M. Laleg-Kirati**\*, E. Crépeau and M. Sorine, "*Separation of arterial pressure into a nonlinear superposition of solitary waves and a windkessel flow*". Biomedical Signal Processing and Control Journal, Vol. 2(3), pp.163-170, 2007.

### Papers under revision

- [R1] S. Mechhoud, **T.M. Laleg-Kirati**, "*Adaptive Energy-based Bilinear Control of First order 1-D Hyperbolic PDEs : Application to a One-Loop Parabolic Solar Collector Trough*", Under revision for Journal of Process Control (2<sup>nd</sup> revision).
- [R2] F.Eleiwi, **T.M. Laleg-Kirati**\*, "*Observer-Based Perturbation Extremum Seeking Control with Input Constraints for Direct-Contact Membrane Distillation process*". under revision for International Journal of Control (2<sup>nd</sup> revision).

### Submitted papers

- [S1] Z. Belkhatir and **T.M. Laleg-Kirati**\*, "*Parameters and fractional differentiation orders estimation for linear continuous-time non-commensurate fractional order systems*", submitted to Systems and Control Letters.
- [S2] Z. Belkhatir, S. Mechhoud and **T.M. Laleg-Kirati**, "*Adaptive observer design for parameters and input estimation of coupled hyperbolic PDE and infinite dimensional ODE using sampled in space sensing*", submitted to IEEE Transactions on Automatic Control.
- [S3] S. Mechhoud and **T.M. Laleg-Kirati**, "*Bilinear Control of Coupled First-Order Hyperbolic PDE and Infinite ODE in the Framework of PDEs with Memory*". Submitted to IEEE Transactions on Automatic Control.
- [S4] A. Karam and **T.M. Laleg-Kirati**, "*Nonlinear Adaptive Descriptor Observer for the Joint States and Parameters Estimation*". Submitted to Automatica.

- [S5] I. N'Doye and **T.M. Laleg-Kirati**, "*Robust Fractional-Order Proportional-Integral Observer for Synchronization of Chaotic Fractional-Order Systems*". Submitted to Journal of Vibration and Control.
- [S6] M.U. Majeed and **T.M. Laleg-Kirati\***, "*Iterative Observer-based Method for Source and Steady-State Potential Field Estimation Problem for Poisson Equation*". Submitted to Automatica.
- [S7] M.U. Majeed and **T.M. Laleg-Kirati\***, "*An iterative observer for boundary estimation for an infinite dimensional elliptic Cauchy problem*". Submitted to Systems and Control Letters.
- [S8] S. Asiri, S. Elmetennani and **T.M. Laleg-Kirati\***, "*Moving-Horizon Modulating Functions-Based Algorithm for Online Source Estimation in a First Order Hyperbolic PDE*", Submitted to Journal of Solar Energy Engineering.

## CONFERENCES

Peer-reviewed conference proceedings (\*speaker. \*\*poster. Students and post-doc advisees are underlined)

- [C1] A. Chahid\*, H. Serrai, R Achten and **T.M. Laleg-Kirati** "*Adaptive Magnetic Resonance Image Signal Enhancement using Squared Eigenfunctions of the Schrodinger Operator*". International Society for Magnetic Resonance in Medicine (ISMRM), April 2017.
- [C2] I. N'Doye and **T.M. Laleg-Kirati**, "*Model Reduction for Nonlinear Distributed Systems*". American Control Conference (ACC), Seattle, WA, USA, May 24–26, 2017.
- [C3] M.U. Majeed and **T.M. Laleg-Kirati\***, "*Iterative Observer Based Method for Source Localization Problem for Poisson Equation in 3D*". American Control Conference (ACC), Seattle, WA, USA, May 24–26, 2017.
- [C4] M.U. Majeed\* and **T.M. Laleg-Kirati**, "*Robust Iterative Observer for Source Localization for Poisson Equation*", 55th Conference on Decision and Control (CDC), Las Vegas, USA 2016.
- [C5] Paul Bendevis\* and **T.M. Laleg-Kirati**, "*Boundary Control of Non-Linear Coupled Heat Systems Using Backstepping*", accepted in the IEEE Multi-Conference on Systems and Control", Buenos Aires, Argentina, September, 2016.
- [C6] M.U. Majeed\* and **T.M. Laleg-Kirati**, "*Localization of Point Sources for Poisson Equation using State Observers*", 2nd IFAC Workshop on Control of Systems Governed by Partial Differential Equations, Italy, June 2016.
- [C7] S. Elmetennani\* and **T.M. Laleg-Kirati**, "*Nonlinear observer design for a 1st order hyperbolic PDE: application to the estimation of the temperature in parabolic solar collectors*", 2nd IFAC Workshop on Control of Systems Governed by Partial Differential Equations, Italy, June 2016.
- [C8] Z. Belkhatir\*, S. Mechhoud and **T.M. Laleg-Kirati**, "*Adaptive observer for the joint estimation of parameters and input for a coupled wave PDE and infinite dimensional ODE system*", American Control Conference (ACC), Boston, MA, USA, July 6–8 2016.
- [C9] S. Elmetennani and **T.M. Laleg-Kirati\***, "*Output Feedback Control of Heat Transport Mechanisms in Parabolic Distributed Solar Collectors*". American Control Conference (ACC), Boston, MA, USA, July 6–8, 2016.
- [C10] S. Mechhoud and **T.M. Laleg-Kirati\***, "*Boundary Adaptive Estimation of Solar Irradiance in Solar Collector Plants*", American Control Conference (ACC), Boston, MA, USA, July 6–8, 2016.
- [C11] S. Asiri\* and **T.M. Laleg-Kirati**, "*Modulating Functions Method for Parameters Estimation of High Order Nonlinear Wave Equations*", SIAM Conference on Nonlinear Waves and Coherent Structures (NWCS16), Philadelphia, Pennsylvania, USA, 2016

- [C12] S. Asiri\*\* and **T.M. Laleg-Kirati**, "*Inverse Source Problem for the Damped Wave Equation: Application to the Hemodynamic Traveling Waves in Human Visual Cortex*", SIAM Conference on Nonlinear Waves and Coherent Structures (NWCS16), Philadelphia, Pennsylvania, USA, 2016
- [C13] J. Zhang, **T.M. Laleg**, S. Bogaert, R. Achten and H. Serrai\*\*, "*Magnetic Resonance Imaging (MRI) Denoising using square eigenfunctions of the Schrödinger operator: Application to brain MRI data*", ISMRM 24th Annual Meeting and Exhibition proceedings, Singapore, May 2016.
- [C14] A. M. Karam\* and **T. M. Laleg-Kirati**, "*Real Time Optimization of Solar Powered Direct Contact Membrane Distillation Based on Multivariable Extremum Seeking*". IEEE Conference on Control Applications (CCA) Sydney, September 2015.
- [C15] C. Zayane-Aissa, **T.M Laleg-Kirati**\*, A. Chemori, "*Control of a perturbed under-actuated mechanical system*". IEEE Conference on Control Applications (CCA) Sydney, September 2015.
- [C16] F. Eleiwi , I N'Doye, **T.M. Laleg-Kirati**\*, "*Feedback control for distributed heat transfer mechanisms in direct-contact membrane distillation system*". IEEE Conference on Control Applications (CCA) Sydney, September 2015.
- [C17] Z. Belkhatir , **T. M. Laleg-Kirati**\*, "*Joint estimation of the fractional differentiation orders and the unknown input for linear fractional non-commensurate system*". IEEE Conference on Control Applications (CCA) Sydney, September 2015.
- [C18] S. Mechhoud\* and **T. M. Laleg-Kirati**, "*Observer-Based Bilinear Control of First-Order Hyperbolic PDEs: Application to the Solar Collector*", IEEE Conference on Decision and Control (CDC), Japan, December 2015.
- [C19] B. Zambri\*, R. Djellouli, **T.M. Laleg-Kirati**, "*Efficient Solution Methodology for Calibrating the Hemodynamic Model using functional Magnetic Resonance Imaging (fMRI) Measurements*", IEEE conference of Engineering in Medicine and Biology Society (EMBC), Milano, Italy, 2015.
- [C20] M.U. Majeed and **T.M. Laleg-Kirati**\*, "*An optimal iterative algorithm to solve Cauchy problem for Laplace equation*", IEEE International Conference on Control Engineering and Information Technology (CEIT), 2015. (**Best paper award**)
- [C21] I. N'Doye and **T.M. Laleg-Kirati**\*, "*Chaotic Convective Behavior and Stability Analysis of a Fractional Viscoelastic Fluids in Porous Media*", International Conference on Control, Engineering and Information Technology (CEIT), 2015.
- [C22] F. Eleiwi\* and **T.M. Laleg-Kirati**, "*Nonlinear Lyapunov-based boundary controls of distributed heat transfer mechanisms in membrane distillation plant*", American Control Conference (ACC), Chicago, 2015.
- [C23] I. N'Doye\* and **T.M. Laleg-Kirati**, "*Fractional-Order Adaptive Fault Estimation for a Class of Nonlinear Fractional-Order Systems*", American Control Conference (ACC), Chicago, USA, 2015.
- [C24] F. Diaz, **T.M. Laleg-Kirati**, "*Observer-based approach for detection of cardiovascular anomalies*", American Control Conference, (ACC), Chicago, USA, 2015.
- [C25] Z. Belkhatir\*, S. Mechhoud and **T.M. Laleg-Kirati**, "*Distributed Cerebral Blood Flow Estimation using a Spatiotemporal Hemodynamic Response Model and a Kalman-Like Filter Approach*". European Control Conference (ECC), Linz, Austria, July 15-17, 2015.
- [C26] M.U. Majeed\* and **T.M. Laleg-Kirati**, "*Iterative observer for boundary estimation for an elliptic equation*", Invited Mini-symposium talk, SIAM Conference on Control and its Applications (CT), Paris, France, July 2015.
- [C27] Z. Belkhatir\* and **T. M. Laleg-Kirati**, "*Characterization of the hemodynamic response in the brain using observer*", SIAM Conference on Control and Its Applications (CT), Paris, France, July 2015.
- [C28] **T.M. Laleg-Kirati**, Z. Kaisserli, R. Achten and H. Serrai\*, "*Magnetic Resonance Spectroscopy data denoising using Semi-Classical Signal Analysis approach: Application to in-vitro MRS data*". ISMRM 2015 Annual Meeting and Exhibition, Toronto, Ontario, Canada, 2015.

- [C29] A. Charara\*, Z. Kaisserli, D. Keyes, H. Ltaief and **T.M. Laleg-Kirati**, "Accelerating an image denoising algorithm using squared eigenfunctions of the Schrödinger operator on multicore architectures". International Computational Science and Engineering Conference, Doha, Qatar, May 2015.
- [C30] F. Eleiwi, **T.M. Laleg-Kirati**\*, "Dynamic modeling and optimization in membrane distillation system", 19th World Congress of the International Federation of Automatic Control, Cape Town South Africa, August 2014.
- [C31] D.Y. Liu, **T.M. Laleg-Kirati**\*, W. Perruquetti and O.Gibaru, "Non-asymptotic state estimation for a class of linear time-varying systems with unknown inputs", 19th World Congress of the International Federation of Automatic Control, Cape Town South Africa, August 2014.
- [C32] S. Asiri\* and **T. M, Laleg-Kirati**, "Wave Velocity Estimation in Heterogeneous Media", International Conference on Applied Mathematics and Approximation Theory, Turkey, May 2015
- [C33] Z. Belkhatir\* and **T.M. Laleg-Kirati**, "Fractional Dynamical Model for Neuro-vascular Coupling", IEEE conference of Engineering in Medicine and Biology Society, Chicago (EMBC), Illinois, USA, August 2014.
- [C34] C. Zayane\*, **T.M. Laleg-Kirati** and R. Djellouli, "On the characterization of single-event related brain activity from functional Magnetic Resonance Imaging (fMRI) measurements", IEEE Engineering in Medicine and Biology Society (EMBC), Chicago, Illinois, USA, August 2014.
- [C35] A.M. Karam\*, **T.M Laleg-Kirati**, "Electrical Thermal Networks for Direct Contact Membrane Distillation Modeling". IEEE Conference on Control Applications (CCA), Antibes, France, 2014.
- [C36] S. Elmetennani\*, **T.M. Laleg-Kirati**, K. Benmansour, M.S. Boucherit and M. Tadjine, "New MPPT Technique for Photovoltaic Applications based on Hybrid Dynamical Approach", EFEA, Paris, November 2014.
- [C37] A. Aldoghaither\*, **T.M. Laleg-Kirati** and D.Y. Liu, "The Determination of an Unknown Source for a Space Fractional Advection Dispersion Equation", proceedings of the 10th IEEE/ASME International Conference on Mechatronic and Embedded Systems and Applications (MESA'14), Italy 2014.
- [C38] M.U. Majeed and **T.M. Laleg-Kirati**\*, "Two-step observer approach to solve Cauchy problem for Laplace equation", PICO'14 Inverse Problems, Control and Shape Optimization, Tunisia, 2014.
- [C39] Z. Belkhatir\*, **T. M. Laleg-Kirati** and M. Tadjine, "Residual Generator for Cardiovascular Anomalies Detection", European Control Conference (ECC), Strasbourg France, 2014.
- [C40] I. N'Doye\*, H. Voos, **T.M.Laleg-Kirati**, and M. Darouach, "H-infinity Adaptive Observer Design and Parameter Identification for a Class of Nonlinear Fractional-Order Systems", IEEE Conference on Decision and Control (CDC), Los Angeles, California, December 2014, USA, 2014.
- [C41] C. Zayane-Aissa\*, D.Y. Liu and **T.M. Laleg-Kirati**, "Joint states and parameters estimation for a class of cascade systems: Application to a hemodynamic model", European Control Conference (ECC), Strasbourg France, July 2014.
- [C42] H. Manouzi\*, **T.M. Laleg-Kirati** , "Solving Stochastic Eigenvalue Problem of Wick", International Conference on Applied Mathematics and Engineering Mathematics Istanbul, Turkey May 2014.
- [C43] F. Eleiwi\* and **T.M. Laleg-Kirati**, "Membrane distillation process modeling: Dynamical approach", International Conference on Desalination and Renewable Energy, ICDRE , Copenhagen Denmark, 2014.
- [C44] M.U. Majeed\* and **T.M. Laleg-Kirati**, "Cauchy Problem for Laplace Equation on a Square Domain using Observers", International Conference on Inverse Problems in Engineering, Krakow Poland, 2014.

- [C45] C. Zayane-Aissa\* and **T.M. Laleg-Kirati**, "*Exact nonlinear characterization of hemodynamic behavior based on fMRI experiments*", Organization for Human Brain Mapping, Hamburg, Germany, 2014.
- [C46] C. Zayane-Aissa\* and **T.M. Laleg-Kirati**, "*Sliding mode observer for hemodynamic characterization under modeling uncertainties*", IEEE Mediterranean Conference on Control & Automation, 2014, Palermo, Italy.
- [C47] S. Elmetennani\* and **T.M. Laleg-Kirati**, "*Fuzzy Universal Model Approximator for Distributed Solar Collector Field Control*", IEEE and UKACC 10th International Conference on Control, Loughborough UK, Jul 2014.
- [C48] S. Elmetennani\* and **T.M. Laleg-Kirati**, "*New Fuzzy Model Approximate for Indirect Adaptive Control of Distributed Solar Collectors*", IEEE Conference on Evolving and Adaptive Intelligent Systems, Linz Austria, June, 2014.
- [C49] S. Elmetennani\* , **T.M. Laleg-Kirati**, "*Fuzzy Approximate Model for Distributed Thermal Solar Collectors' Control*", the Grand Renewable Energy (GRE2014) International Conference, Tokyo Big Sight, Tokyo, Japan, July 2014.
- [C50] **T.M. Laleg-Kirati\*\***, Z. Kaisserli, S. Al Ghamdi, A. Coum, G. Gambarota and H. Serrai, "*Magnetic Resonance Spectroscopy data denoising using the Semi-Classical Signal Analysis approach: Application to in-vitro MRS data*". King Abdullah imaging research center, Annual Scientific Forum, KSA, September, 2014.
- [C51] N. Khoram\*, R. Djellouli, **T.M. Laleg-Kirati** and C. Zayane, "*An efficient iterative method to calibrate the Balloon model using fMRI measurements*", International Conference on Biology and Biomedical Engineering, Venise Italy, 2014.
- [C52] F. Eleiwi\*, **T.M. Laleg-Kirati**, "*Complete dynamic modeling for a membrane distillation process*", International Conference on Numerical and Mathematical Modeling of Flow and Transport in Porous Media, Dubrovnik, Croatia, 2014.
- [C53] F. Eleiwi\*, **T.M. Laleg-Kirati**, "*Full dynamic modeling for a direct contact membrane distillation: membrane and process*", International Congress on Membrane and Membrane Processes, Suzhou, China, 2014.
- [C54] A.M. Karam\* and **T. M. Laleg-Kirati**, "*Dynamical Model for Direct Contact Membrane Distillation based on Electrical Analogues*", International Congress on Membranes and Membrane Progresses (ICOM2014), Suzhou, China, 2014.
- [C55] Z. Kaisserli\* and **T.M. Laleg-Kirati**, "*Image denoising using discrete spectrum of a Schrödinger operator*". SIAM Conference on Image Science, Hong Kong, May 2014.
- [C56] S. Asiri\* and **T.M. Laleg-Kirati**, "*Modulating Functions Method for Wave Source Estimation*", International Conference on Inverse problems: Modeling and Simulations, Fethiye, Turkey, May 2014
- [C57] A. Aldoghaither\*, **T.M. Laleg-Kirati** and D.Y. Liu, "*A Novel Approach for Parameter and Differentiation Order Estimation for a Space Fractional Advection Dispersion Equation*", International Conference on Inverse problems: Modeling and Simulations, Fethiye, Turkey, May 2014.
- [C58] N. Khoram\*, R. Djellouli, **T. M. Laleg-Kirati**, C. Zayane, "*A novel approach to calibrate the Balloon Model using functional Magnetic Resonance Imaging (fMRI) measurements*", International Conference on Inverse Problems: Modeling and Simulation (IPMS-2014), Fethiye, Turkey, May 2014
- [C59] D.Y. Liu\*, **T.M. Laleg-Kirati**, O. Gibaru, and W.Perruquetti, "*Fractional Order Numerical Differentiation with B-Spline Functions*", International Conference on Fractional Signals and Systems, Gent, Belgium, 2013



- [C60] M.U. Majeed, C. Zayane-Aissa\*, and **T.M. Laleg-Kirati**, "*Cauchy Problem for the Laplace's Equation: An Observer based Approach*", IEEE International Conference on Systems and Control, Algiers, 2013.
- [C61] S. Khelouat\*, **T.M.Laleg-Kirati**, A. Benalia, M. Djemai and D. Boukhetala, "*On sliding mode observer for a Hybrid Three-Cell Converter*", IEEE International Conference on Systems and Control, Algiers, 2013
- [C62] A. Aldoghaither\* and **T.M. Laleg-Kirati**, "*Inverse Source Problem for a Space Fractional Advection-Dispersion Equation*", International Conference on Mathematical and Numerical Aspects of Waves (WAVES), Gammarth, Tunisia, 2013.
- [C63] S. Asiri , **T.M. Laleg-Kirati** and C. Zayane\*, "*Inverse Source Problem for a One-dimensional Wave Equation Using Observers*", International Conference on Mathematical and Numerical Aspects of Waves (WAVES), Gammarth, Tunisia, 2013.
- [C64] **T.M. Laleg-Kirati\***, H. Arabi M. Tadjine and C. Zayane, "*Estimation of the Neuronal activation using fMRI data: an observer-based approach*", American Control Conference (ACC), Washington, DC, USA, 2013.
- [C65] D.Y. Liu, **T.M. Laleg-Kirati\***, O. GIBARU, and W. Perruquetti, "*Identification of fractional order systems using modulating functions method*", American Control Conference (ACC), Washington, DC, USA, 2013.
- [C66] F. Eleiwi\*, **T.M. Laleg-Kirati**, "*Fault Detection in Induction Machine using a Semi-Classical signal analysis method*", IET Control and Automation conference 2013.
- [C67] D.Y. Liu\*, **T.M. Laleg-Kirati** and O. GIBARU. "*Fractional order differentiation by integration: an application to fractional linear systems with noisy input*", IFAC Workshop on Fractional Differentiation and its Applications, 2013, Grenoble, France.
- [C68] Z. Kaisserli\*, **T.M. Laleg-Kirati** and D.Y. Liu, "*Semi-classical based image reconstruction*", the Sixth Colloquium on Trends in the Applications of Mathematics in Tunisia, Algeria, Morocco, 2013.
- [C69] M.U. Majeed\* and **T.M. Laleg-Kirati**, "*Cauchy problem for Laplace equation: An observer based Approach*", Applied Inverse Problem Conference, Daejeon South Korea, July 2013.
- [C70] M.U. Majeed \* and **T.M. Laleg-Kirati**, "*Two-step observer approach to solve Cauchy problem for Laplace equation*", Franco German Summer School on Inverse Problems and PDEs, Bremen Germany, October 2013.
- [C71] D. Y. Liu\*, O. GIBARU, W. Perruquetti and **T. M. Laleg-Kirati**, "*Fractional order differentiation by integration with Jacobi polynomials*", IEEE Conference on Decision and Control (CDC), 2012, Hawaii, USA.
- [C72] D.Y. Liu\* and **T. M. Laleg-Kirati**, "*Mathematical properties of a semi-classical signal analysis method: noisy signal case*", International Conference on Systems and Computer Science, Villeneuve dascq, France, 2012.
- [C73] F. Diaz-Ledezma\* and **T.M. Laleg-Kirati**, "*Detection of Cardiovascular Anomalies: Hybrid Systems Approach*", In proceeding Analysis and Design of Hybrid Systems (ADHS 12), June, 2012.
- [C74] S. Khelouat\*, A. Benalia, D. Boukhetala and **T. M. Laleg-Kirati**, "*A Geometric Approach for Fault Detection and Isolation of Stator Short circuit failure in a Single Asynchronous Machine*". American Control Conference (ACC), Montreal, June 2012.
- [C75] **T.M. Laleg-Kirati\*\***, A. Radwan and C. Zayane, "*An observer-based method to solve the Cauchy problem for Laplace equation*", Inverse Problems, Control and Shape Optimization, PICO conference April 2012.
- [C76] A. M. Karam\*\*, C. Zayane and **T.M. Laleg-Kirati**, "*Nonlinear Neural Network Approach for the Inversion of fMRI Response*", IEEE conference of Engineering in Medicine and Biology Society (EMBC), Chicago, 2012.

- [C77] F. Diaz-Ledezma\*\* and **T.M. Laleg-Kirati**, "*Observer-Based Approach for Cardiovascular Anomalies Detection*", IEEE conference of Engineering in Medicine and Biology Society (EMBC), Chicago, 2012.
- [C78] Z. Kaisserli\* and **T.M. Laleg-Kirati**, "*Semi-classical signal analysis*". Congress of Mathematicians Algerians, CMA-2012, Annaba, Algeria, March 2012.
- [C79] F. Eleiwi\*, **T.M. Laleg-Kirati**\*, S. Khelladi, F. Baki, "*A Semi-Classical Signal Analysis Method for the Analysis of Turbo machinery Flow Unsteadiness*", World Academy of Science, Engineering and Technology 2011.
- [C80] **T.M. Laleg-Kirati**\*, E. Crépeau and M. Sorine, "*Signal analysis by expansion over the squared eigenfunctions of an associated Schrödinger operator*", Waves, Pau, France, June 2009.
- [C81] M. Sorine, Q. Zhang\*, **T.M. Laleg** and E. Crépeau, "*Parsimonious Representation of Signals Based on Scattering Transform*", World Congress of the International Federation of Automatic Control (IFAC), Seoul, July 2008.
- [C82] **T.M. Laleg**\*, E. Crépeau, Y. Papelier and M. Sorine, "*Arterial Blood Pressure Analysis Based on Scattering Transform I*". IEEE conference of Engineering in Medicine and Biology Society (EMBC), Lyon France, August 2007.
- [C83] **T.M. Laleg**\*, C. Médigue, F. Cottin and M. Sorine, "*Arterial Blood Pressure Analysis Based on Scattering Transform II*". IEEE conference of Engineering in Medicine and Biology Society (EMBC), Lyon France, August 2007.
- [C84] **T.M. Laleg**\*, E. Crépeau and M. Sorine, "*Travelling Wave Analysis and Identification. A Scattering Theory Framework*". European Control Conference (ECC), Kos, Greece, July 2007.
- [C85] **T.M. Laleg**\*, E. Crépeau and M. Sorine, "*Separation of Arterial Pressure into Solitary Waves and Windkessel Flow*", IFAC Symposium on Modeling and Control in Biomedical Systems, Reims, France, September 2006.
- [C86] **T.M. Laleg**\*, M. Sorine, Q. Zhang, "*Input Impedance of the Arterial System Using Parametric Models*", ICES06, Oum El Bouaghi, Algeria, May 2006.

Abstracts (\*Speaker, \*\*poster, students and post-doc advisees are underlined)

- [A1] S. Elmetennani\*\* and **T.M. Laleg-Kirati**, "*Output Feedback Control of Heat Transport Mechanisms in Parabolic Distributed Solar Collectors*", Human-Machine Networks and Intelligent Infrastructure Conference, KAUST, October 2015.
- [A2] Z. Belkhatir\*\* and **T.M. Laleg-Kirati**, "*Adaptive observer for characterization of the hemodynamic response in the brain from fMRI data*", Human-Machine Networks and Intelligent Infrastructure Conference, KAUST, October 2015.
- [A3] A.M. Karam\*\* and **T.M. Laleg-Kirati**, "*Sustainable Desalination for Smart Cities*", poster presented at the Human-Machine Networks and Intelligent Infrastructure Conference, KAUST, Saudi Arabia, October 2015.
- [A4] F. Eleiwi\*\*\*, **T.M. Laleg-Kirati**, "*Perturbation Extremum Seeking for Direct-Contact Membrane Distillation process*", Human-Machine Networks and Intelligent Infrastructure Conference, KAUST, October 2015.
- [A5] S. Asiri\*\* and **T. M. Laleg-Kirati**, "*Inverse Source Problem Using Modulating Functions: Application to The Hemodynamic Traveling Waves in Human Visual Cortex*", International Workshop On Multi-scale Waveform Modeling And Inversion, KSA, KAUST, March 2015.
- [A6] Z. Kaisserli\*\* and **T.M. Laleg-Kirati**, "*Image representation and denoising using squared eigenfunctions of the 2D Schrödinger operator*". 2nd KAUST-NSF Research Conference On Electronic Materials, Devices And Systems For A Sustainable Future, KAUST, KSA, February, 2015.

- [A7] I. N'Doye\*\* and **T.M. Laleg-Kirati**, "*Synchronization and secure communication for fractional-order chaotic systems*", NSF-KAUST conference, February, 2015.
- [A8] F. Eleiwi\*\* , **T.M. Laleg-Kirati**, "*Dynamic modeling and experimental validation for a Direct-Contact Membrane Distillation (DCMD) plant*", NSF-KAUST conference, KAUST, February 2015.
- [A9] Z. Kaisserli, **T.M. Laleg-Kirati**\*\* , "*Representation of two-dimensional potential using discrete spectrum of the Schrödinger operator*". Global Collaborative Research (GCR) Symposium, KAUST, KSA, March, 2014.
- [A10] F. Eleiwi\*\* , **T.M. Laleg-Kirati**, "*Dynamic modeling and optimization in direct contact membrane distillation (DCMD) system*", Winter Enrichment Program WEP, KAUST, January 2014.
- [A11] M.U. Majeed\*\* and **T.M. Laleg-Kirati**, "*Towards computing the actual heart potential*", Winter Enrichment Program WEP, KAUST K.S.A, January 2014.
- [A12] S. Elmetennani\*\* , **T.M. Laleg-Kirati**, "*Nonlinear Control Based Fuzzy Model for a distributed solar collector*", Winter Enrichment Program WEP, KAUST, January 2014.
- [A13] A. Aldogaither\*\* , **T.M. Laleg-Kirati** and Dayan Liu, "*Direct and inverse problem for space fractional dispersion equation*", Workshop on Fractional partial differential equations, February 2014.
- [A14] Z. Kaisserli\*\* , **T.M. Laleg-Kirati** and Da-Yan Liu, "*Reconstruction of two-dimensional potential with the squared eigenfunctions of the Schrödinger operator*". International workshop on Multiscale Modeling, Simulation and Inversion, KAUST, KSA, May, 04-05, 2013.

#### Technical Reports

- [T1] S. Asiri and **T.M. Laleg-Kirati**, "*Modulating Functions-Based Method for Parameters and Source Estimation in One-Dimensional Partial Differential Equations*". ArXiv, 2015, <http://arxiv.org/abs/1601.02645>
- [T2] Z. Kaisserli and **T.M. Laleg-Kirati**, "*Image representation and denoising using squared eigenfunctions of Schrödinger operator*". 2014, ArXiv, <http://arxiv.org/abs/1409.3720>
- [T3] M.U. Majeed and **T.M. Laleg-Kirati**, "*A space iterative method to solve Cauchy problem for Laplace equation*". 2016, ArXiv, <http://arxiv.org/abs/1404.6957>
- [T4] A. Aldoghaither, **T.M. Laleg-Kirati**, and D.Y. Liu, "*Direct and Inverse Source Problem for a Space Fractional Advection Dispersion Equation*", ArXiv, 2014, <http://arxiv.org/abs/1401.3153>
- [T5] A. Aldoghaither, **T.M. Laleg-Kirati** and D.Y. Liu, "*A Novel Approach for Parameter and Differentiation Order Estimation for a Space Fractional Advection Dispersion Equation*", ArXiv, <http://arxiv.org/abs/1402.2366>
- [T6] S. Asiri , **T.M. Laleg-Kirati** and C. Zayane, "*An adaptive observer for wave equation's source estimation*", ArXiv, 2014, <http://arxiv.org/abs/1401.4646>.
- [T7] **T.M. Laleg-Kirati**, C. Médigue, Y. Papelier, F. Cottin and A. Van de Louw, "*Validation of a semi-classical Signal analysis method for Stroke volume variation assessment: a comparison with the PiCCO technique*", INRIA research report, January 2010
- [T8] **T.M. Laleg**, C. Médigue, Y. Papelier, E. Crépeau, M. Sorine, "*New cardiovascular Indices Based on a Nonlinear Spectral Analysis of Arterial Blood Pressure Waveforms*". INRIA research report, October 2007.

#### Patents

- [P1] Taous Meriem Laleg-Kirati, Zineb Kaiserli, "*patent pending: Image de-noising and analysis using a discrete spectrum of a Schrödinger operator*", US provisional application, PCT/US2015/027588.
- [P2] Taous Meriem Laleg-Kirati; Fadi Eleiwi; Ayman Karam - "*patent pending: Temperature and membrane characteristics soft sensing of membrane distillation process*", US provisional application PCT/IB2016/055467.
- [P3] Taous Meriem Laleg-Kirati; Fadi Eleiwi; Ayman Karam - "*patent pending: Real Time Optimal controller for Solar Powered Direct Contact Membrane Distillation*", US provisional application PCT/IB2016/053946.
- [P4] Taous Meriem Laleg-Kirati; Shahrazad Elmetennani - "*patent pending: Robust Lyapunov controller for uncertain systems*" -US provisional application, PCT/IB16/054884.
- [P5] Taous Meriem Laleg-Kirati; Ayman Karam - "*patent pending: Smart membranes for monitoring membrane-based desalination process*", US provisional application, 62/318,008.

**After joining KAUST**

- Panelist, Women in Science and engineering sessions, KAUST-NSF conference, January 31, 2017.
- Panelist, Women in Science and engineering session, Winter Enrichment Program (WEP), KAUST, January 15, 2017.
- Invited speaker at "scientific college", Nuremberg castle, Germany, March 28 – 31, 2017.
- Seminar at Harvard School of Engineering and Applied Sciences, July 13, 2016.
- Invited session speaker at ACC 2016, CDC 2016, SIAM Control and Its Applications conference 2015.
- Human machine networks and intelligent infrastructures conference, KAUST, October 2015.
- Applied Mathematics summer school, KAUST, September 2015.
- Seminar USTHB University, Algeria, May 21, 2015.
- Seminar Paris 6 University, April 7, 2015.
- NSF-KAUST workshop, February 2015.
- Invited Keynote presentation, Workshop on Fractional partial differential equations, February 7– 9, 2014, Texas A&M.
- Invited seminar California State University CSUN university, February 12th 2014.
- Invited Keynote speaker at inverse problems, Control and Shape Optimization conference May 7– 9, Tunisia, 2014.
- Invited speaker at the International congress of the Euro-Maghrebin laboratory of Mathematics and interaction, Rabat, Morocco, February, 12–15, 2013.
- Seminar at King Abdullah Medical Imaging Center, Jeddah, December 17, 2012.
- EE and AMCS graduate seminars.

**Before joining KAUST**

- A talk at Versailles university, A half day around the heart, March, 31, 2010.
- IMB seminar, Bordeaux university, January, 04, 2010.
- A talk at l'Institut de Mathematiques de Toulouse (IMT), France, groupe de travail "ondes et structures", April 10, 2008.
- Poem's team seminar, INRIA, Paris-Rocquencourt, France, February 21, 2008.
- Seminar at "L'unité de Biologie Intégrative des adaptations à l'exercice", Génomole France December 13, 2007.
- A talk at Paris XI university, France, Numerical study group, March 07, 2007..
- Seminar, department of Electrical and Computer Engineering ECE, North Carolina State, August 2, 2006.
- Seminar in the Department of Electrical Engineering, Tizi-Ouzou University, Algeria, May 13 2006.
- A half-day on simulation of blood flow, a postdoctoral seminar with Charles A. Taylor team and REO team INRIA Rocquencourt, France, 23 September 2005.

**RESEARCH FUNDS**1. Funding Agency/Body: **KAUST, Competitive Research Grant Program**

Project Title: Multi-scale, multi-physics simulation and uncertainty quantification for porous media processes and applications

Principal Investigator: Victor Calo

Co-Principle Investigators: Taous Meriem Laleg-Kirati, Markus Hadwiger, Suzana Nunes, Ga-

nesh Sundaramoorthi, Shuyu Sun, Peter A.Markowich, Chuck Hansen  
Start date: March 2012  
Duration: 3 years  
Total funds: \$ 4.5 M

2. Funding Agency/Body: **KAUST-KFUPM Initiative**  
Project Title: Addressing Spectrum Scarcity through Optical Wireless Communications  
Principal Investigator: Boon Ooi  
Co-Principle Investigators: Taous Meriem Laleg-Kirati, Slim Alouini, Jr-Hau He  
Start date: 1 July 2016  
Duration: 3 years  
Total funds: \$ 873000
  
3. Funding Agency/Body: **KAUST-KFUPM Initiative**  
Project Title: Fractional Diffusion Modeling of Transport in Subsurface and Oceanic Flows  
Principal Investigator: Omar Knio  
Co-Principle Investigators: Taous Meriem Laleg-Kirati, Shuyu Sun, David Keyes, David Ketcheson  
Start date: 1 July 2016  
Duration: 3 years  
Total funds: \$ 851940
  
4. Funding Agency/Body: **SABIC:**  
Project Title: Modeling, Design, Simulation and Realization of Fractional Order Circuits  
Principal Investigator: Khaled Salama  
Co-Principle Investigators: Taous Meriem Laleg-Kirati, Hakan Bagci  
Start Date: 1 October 2015  
Duration: 18 months  
Total funds: \$355,848
  
5. Funding Agency/Body: **KAUST OCRF-Conferences**  
Project Title: Human-Machine Networks and Intelligent Infrastructure  
Principle Investigators: Jeff Shamma  
Co-Principle Investigators: Taous Meriem Laleg-Kirati  
Conference dates: October 5-7, 2015  
Total funds: \$ 65961
  
6. Funding Agency/Body: **KAUST OCRF-Conferences**  
Project Title: Multi-scale Waveform Modeling and Inversion  
Principle Investigators: Ying Wu  
Co-Principle Investigators: Taous Meriem Laleg-Kirati, Tariq Alkhalifah, Victor Calo, Martin Mai, Yalchin Efendiev  
Conference dates: March 22-24, 2015  
Total funds: \$ 78500
  
7. Funding Agency/Body: **KAUST OCRF-Conferences**  
Project Title: International Workshop on Multiscale Waveform Modeling, Simulation, and Inversion  
Principle Investigators: Taous Meriem Laleg and Tariq Alkhalifah  
Co-Principle Investigators: Victor Calo, Ying Wu, Martin Mai, Yalchin Efendiev

Conference dates: May 4-7, 2013  
Total funds: \$95000

## RESEARCH SUPERVISED

Supervision at KAUST		
Primary Supervision-Masters Completed: 9 In progress: 1	Primary Supervision-Ph.D Completed: 4 In progress: 7	Post-doc Supervision Total: 5

## King Abdullah University of Science and Technology

### Post-docs supervised:

1. Mohamed Ghattassi:  
Start date: January 2017  
Field of study: Control and estimation problems for partial and fractional partial differential equations  
Departure date: January 2018  
Previous Institution awarding degree: University of Lorraine, CRAN-CNRS, France
2. Ibrahima N'doye:  
Start date: July 2014  
Field of study: Control and estimation problems for fractional order systems  
Departure date: July 2017  
Previous Institution awarding degree: University of Lorraine, CRAN-CNRS, France
3. Sarah Mechhoud:  
Start date: June 2014  
Field of study: Control and estimation problems for hyperbolic bilinear equations  
Departure date: September 2016  
Previous Institution awarding degree: Grenoble University, France  
Next position: Assistant Professor Skikda university, Algeria
4. Chadia Zayane:  
Start date: March 2012  
Field of study: Estimation problems for nonlinear differential equations with application to the characterization of the brain activity  
Departure date: March 2015  
Previous Institution awarding degree: Ecole des Mines, Paris, France  
Next position: Post-doc at KAUST with Prof. Jeff Shamma
5. Dayan Liu:  
Start date: January 2012  
Field of study: Identification, parameter estimation and fractional order numerical differentiation  
Departure date: November 2013  
Previous Institution awarding degree: INRIA-University of Lille 1, France

Current position: Assistant Professor in INSA (French National Institute of Applied Sciences)  
Centre Val de Loire

### PhD students supervised

1. Abeer Aldoghaither, **graduated**, KAUST AMCS, 2011- 2015, Project: Methods and algorithms to solve inverse problems for fractional advection dispersion equation, currently **Assistant professor at Dar-Elhikma University** in Jeddah.
2. Fadi Eleiwi, **graduated**, KAUST EE, 2012-2015, Project: Dynamic Modeling and Control of Distributed Heat Transfer Mechanisms : Application to a Membrane Distillation Module, currently **Research Electrical Engineer, Research Product Development Innovations**, KSA.
3. Ayman Karam, **graduated**, KAUST EE, start date: 2012-2016. Project: Reduced Order Dynamic Modeling and Process Optimization of Solar Powered Direct Contact Membrane Distillation. Currently **working with Daaminno**.
4. Zineb Kaisserli, **graduated**, Mostaganem University, 2012- 2015, Project: Image reconstruction and denoising using squared eigenfunctions of the Schrödinger operator. While having been formally enrolled and having defended PhD thesis at Mostaganem University in Algeria, this student spent extended periods at KAUST working on the semi-classical analysis of the Schrödinger operator and its applications to image processing. She published with KAUST affiliation together with Prof. Laleg-Kirati, who was her main PhD supervisor (a second formal "administrative" supervisor was also assigned at Mostaganem University). Currently **lecturer at Mostaganem University** in Algeria.
5. Usman Mohammed Majeed, **In progress**, KAUST AMCS, start date: 2013. Expected graduation 2017. Project: Boundary estimation for elliptic problem using observers. Passed qualifier and proposal.
6. Shahrazed Elmetennani, **In progress**, KAUST EE, start date: 2012, expected graduation 2017. Project: Feedback and Optimal Control of Hyperbolic Heat Conductive Systems: Application to the Concentrated Solar Collectors field. Passed qualifier and proposal.
7. Sherafa Asiri, **In progress**, KAUST AMCS, start date: 2013, expected graduation 2017, Project: Methods and Algorithms for Parameters and Source Estimation of PDEs: Modulating Functions-Based Approach. Passed qualifier and proposal.
8. Zehor Belkhatir, **In progress**, KAUST EE, start date: 2013. Expected graduation 2017, Project: Estimation Methods for the Characterization of Brain Activity from fMRI Measurements. Passed qualifier and proposal.
9. Abderazak Chahid, **In progress**, KAUST EE, start date: 2016. Expected graduation: 2019. Project: Image reconstruction and denoising based on the squared eigenfunctions of the Schrödinger operator.
10. Asem Al-Alwan, **In progress**, KAUST EE, start date: 2016. Expected graduation: 2019. Project: Control problems in FSO systems.



11. Lilia Ghaffour, **In progress**, KAUST AMCS, start date: 2016. Expected graduation: 2019. Project: Control of fractional PDE.

### PhD Dissertation Committee

1. Seifallah Jardak, **proposal defense**, December 2016, (PhD advisor: Prof. Slim Alouini ), KAUST EE. Expected graduation 2017. Project: Improved Estimation Techniques for MIMO and passive Radars.
2. Ikram Boukhedimi, **proposal defense**, December 2016, (PhD advisor: Prof. Slim Alouini ), KAUST EE. Expected graduation 2017. Project: Performance Analysis of Large Scale MIMO Systems via Random Matrix Theory Approaches.
3. Laila Afifi, **graduated**, June 2016, (PhD advisor: Prof. Tareq AlNaffouri ), KAUST EE, graduated December 2016. Project: Unified Tractable Model for large-scale Networks using Stochastic Geometry: Analysis and Design.
4. Emna Zedini, **graduated**, November 2016, (PhD advisor: Prof. Slim Alouini), KAUST EE. Project: Free Space Optics for Next Generation Cellular Backhaul.
5. Hessa AlQuwaiee, **graduated**, November 2016, (PhD advisor: Prof. Slim Alouini), KAUST EE. Project: Generalized Turbulence and Misalignment Models for the Performance Analysis of Free-Space Optical Links.
6. Furrukh Sana, **graduated**, October 2016, (PhD advisor: Prof. Tareq AlNaffouri), KAUST EE. Project: sparse signal processing with applications in target tracking and geosciences.
7. Shahid Saghir, **graduated**, September 2016 (PhD advisor: Prof. Mohamed Lounis), KAUST ME. Project: Investigation of the Static and Dynamic Behavior of MEMS Rectangular Microplates under Electrostatic Actuation.
8. Hamza Soury, **graduated**, June 2016, (PhD advisor: Prof. Slim Alouini), KAUST EE. Project: On the Performance Analysis of Communication Systems Perturbed by Non-Gaussian Noise.
9. Qurrat-Ul-Ain Nadeem, **proposal defense**, October 2016, (PhD advisor: Prof. Slim Alouini), KAUST EE, expected graduation: 2017. Project: Full-Dimension MIMO Systems for Next Generation Cellular Networks.
10. Konpal Ali, **proposal defense**, October 2016, (PhD advisor: Prof. Slim Alouini), KAUST EE. Expected graduation: 2017. Project: Modeling, Analysis, and Design of 5G Networks using Stochastic Geometry.
11. Mohammad Shaqura, **proposal defense**, February 2016, (PhD advisor: Prof. Jeff Shamma), KAUST ME. expected graduation: 2017. Project: Iterative Learning For Aggressive Maneuvers Of Autonomous Systems In Uncertain Dynamic Environments.
12. Mohamed Abdelkader, **proposal defense**, (PhD advisor: Prof. Jeff Shamma), KAUST ME. Expected graduation: 2017. Project: Distributed Cooperative Control with Low Communication Overhead.

13. Adam Bouchaala, **proposal defense**, (PhD advisor: Prof. Mohammed Younis), KAUST ME. Expected graduation: 2017. Project: Electrostatically Actuated MEMS for Mass and Gas Detection.
14. Nadine Hajj, **proposal defense**, January and July 2016, (PhD advisor: Prof. Mariette Awad), American University of Beirut (AUB). Project: A Functional Brain Network Model using Graph Theory and Machine Learning.
15. Ghada Sindi, **proposal defense**, October 2015, (PhD advisor: Prof. Tariq Alkhalifa), KAUST Earth Science. expected graduation: 2017. Project: Wave field extrapolation schemes and Residual wave field extrapolation for FWI.
16. Fatima Taousser, **graduated**, (PhD advisor: Prof. Mohammed Djemai from University of Valenciennes), University of Sidi-Belabes Algeria, Mathematics program. Graduated: 2015. Project: Stability analysis of a class of uncertain switched systems on time scale
17. Mudassir Masood, **graduated**, (PhD advisor: Prof. Tareq AlNaffouri), KAUST EE. Graduated: 2015. Project: Distribution Agnostic Structured Sparsity Recovery: Algorithms and Applications.
18. Fahd Ahmed Khan, **graduated**, (PhD advisor: Prof. Slim Alouini), KAUST EE. Graduated: 2013. Project: Analytical Framework for the Performance Evaluation of Cooperative and Cognitive Radio Systems With Practical Consideration.
19. Mahdi BenGhorber **graduated**, (PhD advisor: Prof. Slim Alouini), KAUST EE. Graduated: 2013. Project: Contributions Towards Practical Cognitive Radios Systems.
20. Ramzi Djebbi, **proposal defense**, (PhD advisor: Prof. Tariq Alkhalifa), KAUST Earth Science. expected graduation: 2016. Project: Travel time sensitivity kernels analysis for isotropic/anisotropic media: Application to finite frequency travel time inversion.
21. Xuxin, **proposal defense**, May 2013, (PhD advisor: Prof. Tariq Alkhalifa), KAUST Earth Science. expected graduation: 2016. Project: Efficient anisotropic media treatment using effective isotropic models.

### MS students supervised

1. Mohamed Bahloul **In progress**, KAUST EE, Start date: 2017. MS thesis: Fractional modeling of blood flow.
2. Sharefa Asiri, **graduated**, KAUST AMCS, Start date: 2012, graduated: 2013. MS thesis: An Inverse Source Problem for a One-dimensional Wave Equation: An Observer-Based Approach. Outcome: one journal paper published and a conference paper. **Currently PhD student under my supervision.**
3. Fernando Diaz, **graduated**, KAUST ME, Start date: 2010 - graduated 2012. MS thesis: Detection of Cardiovascular Anomalies: An Observer-Based Approach. Outcome: one chapter book and two conferences (ACC and IFAC). **Worked for Aramco then joined Leibniz University in Germany for PhD studies.**

4. Ayman Karam, **graduated**, KAUST ME, Start date: 2010 - graduated 2012. MS thesis: Non-linear Neural Network Approach for fMRI Data Analysis. Outcome: one journal paper and a conference paper. **Currently PhD student under my supervision.**
5. Sultan Albarakati, **graduated**, KAUST AMCS, Start date: 2013, graduated: 2014. Directed research project: numerical methods for fractional PDE. **Currently PhD student at KAUST.**
6. Saja Almohammadi, **graduated**, KAUST AMCS, Start date: 2013, graduated: 2014. Directed research project: Numerical analysis of denoising methods using squared eigenfunctions of the Schrödinger operator. **Currently PhD student at KAUST.**
7. Amer Saigh, **graduated**, KAUST ME, Start date: 2010 - graduated 2012. Directed research project: Estimation for wave properties using observer. **Currently working with Aramco.**
8. Lorenzo Ochoa Diaz, **graduated**, KAUST EE, Directed research project: optimal choice of a design parameter for signal denoising with squared eigenfunctions of a Schrödinger operator. start date: 2013, graduated: 2014. **Currently PhD student at KAUST.**
9. Jia Guo, **graduated**, KAUST AMCS, start date: 2011, graduated: 2012. Directed research project: Analysis of fractional order systems.
10. Mohamad Al Absi, **graduated**, KAUST ME, Start date: 2010, graduated: 2011. Directed research project: Fault detection and isolation of hybrid systems.

#### **MS students co-supervised**

Nafiseh Khoram, **graduated**, (Supervisor: Prof. Rabia Djellouli) California State University. MS thesis: On the Characterization of single-Event related Brain activity from functional Resonance Imaging (fMRI) measurements. Start date: 2012, graduated 2013. **worked as Data Analyst at Didibood and currently Managing Director at Parsbanan Group.**

#### **MS thesis committee**

1. Sidrah Javed, **graduated**, (MS advisor: Prof. Slim Alouini), KAUST EE, Graduated: 2016. Project: Multiple Antennas Systems and Full Duplex Relay Systems with Hardware Impairments: New Performance Limits.
2. Mohammed M. Alrashed, **graduated**, (MS advisor: Prof. Jeff Shamma), KAUST EE, Graduated: 2016. Project: Agent Based Modeling and Simulation of Pedestrian Crowds In Panic Situations.
3. Ayed Mofareh Alrashdi, **graduated**, (MS advisor: Prof. Tareq AlNaffouri), KAUST EE, Graduated: 2016. Project: On the MSE Performance and Optimization of Regularized Problems.
4. Abdulrahman Alanazi, **graduated**, (MS advisor: Prof. Tareq AlNaffouri), KAUST EE, Graduated: 2016. Project: Low-Complexity Regularization Algorithms for Image Deblurring.

5. Hasna Hamoud Alzahrani, **graduated**, (MS advisor: Prof. Omar Knio), KAUST AMCS, Graduated: 2016. Project: Mixed, nonsplit, extended stability, stiff integration of reaction diffusion equations.
6. Mohamed AlSharif, **graduated**, (MS advisor: Prof. Tareq AlNaffouri), KAUST EE, Graduated: 2016. Project: Hand gesture recognition using Ultrasonic Waves.
7. Mohamed Suliman, **graduated**, (MS advisor: Prof. Tareq AlNaffouri), KAUST EE, Graduated: 2016. Project: Regularization Techniques for Linear Least-Squares Problems.
8. Mohamed R. Znaidi, **graduated**, (MS advisor: Prof. Slim Alouini), KAUST EE, Graduated: 2016. Project: Performance Limits of Communication with Energy Harvesting.
9. Qais Al Hennawi, **graduated**, (MS advisor: Prof. Mohamed Younis), KAUST ME, Graduated: 2015. Project: Nonlinear Dynamics of Electrostatically Actuated MEMS Arches.
10. Abdulrahman Abuzaid, **graduated**, (MS advisor: Prof. Slim Alouini), KAUST EE, Graduated: 2014. Project: Joint Preprocessor-Based Detectors for One-Way and Two-Way Cooperative Communication Networks.
11. Nabil Masmoudi, **graduated**, (MS advisor: Prof. Tariq Alkhalifa), KAUST Earth Science, Graduated: 2014. Project: High Frequency Asymptotic Methods for Traveltimes and Anisotropy Parameter Estimation in Azimuthally Varying Media.
12. Hani Alzahrani, **graduated**, (MS advisor: Prof. Tariq Alkhalifa), KAUST Earth Science, Graduated: 2014. Project: Testing the Feasibility of Using PERM to Apply Scattering-Angle Filtering in the Image-Domain for FWI Applications.
13. Dalal Sukkari, **graduated**, (MS advisor: Prof. David Keyes), KAUST AMCS, Graduated: 2013. Project: Implementing a New Dense Symmetric Eigensolver on Multicore Systems.
14. Hessa Alquwaiee **graduated**, (MS advisor: Prof. Slim Alouini), KAUST EE, Graduated: 2013. Project: Bidirectional Fano Algorithm for Lattice Coded MIMO Channels.
15. Fawwad Qureshi, **graduated**, (MS advisor: Prof. Georgiy Stenchikov), KAUST Earth Science, Graduated: 2012. Project: Study of Radiative Forcing of Dust Aerosols and its impact on Climate Characteristics.
16. Zaid Salwan, **graduated**, (MS advisor: Prof. Ibrahim Hoteit), KAUST AMCS, Graduated: 2012. Project: Tsunami Prediction and Earthquake Parameters Estimation in the Red Sea.
17. Shanwen Qiu, **graduated**, (MS advisor: Prof. Christian Claudel), KAUST EE, Graduated: 2012. Project: An exact and grid-free numerical scheme for the hybrid two phase traffic flow model based on the Lighthill-Whitham-Richards model with bounded acceleration.

**Visiting students mentoring  
MS thesis**

1. Zehor Belkhatir, **graduated**, Polytechnic School of Algiers. Start date: 2011, graduated: 2012 (visited KAUST spring 2012). MS thesis: Outcome: a book chapter and a paper presented at European Control Conference 2014, Currently PhD student under my supervision.
2. Lokmane Belmazaoud, **graduated**, Jijel University Algeria, Thesis at KAUST spring 2014. MS thesis: Contribution to modeling and identification of the neural activity. Currently PhD student in Algeria.
3. Nawel Chibikh, **graduated**, Bordeaux University, France. Thesis at KAUST April-september 2013. MS thesis: Application of ensemble Kalman filter in fMRI.
4. Ammar Radwan, **graduated**, Supelec Paris, Thesis at KAUST April November 2011. MS thesis: Cauchy problem for Laplace equation using observer. Outcome: conference paper at PICO F 2012.

### **Previous and current internship students**

1. Xingang Guo, Automation School of Control Engineering Northeastern University at Qinhuangdao, December 2016-May 2017.
2. Fahd Alhazmi, University of Texas at Dallas, March-September 2016, a paper under preparation.
3. Abdullah AlNashwan, KGSP student, June-July 2016.
4. Sarah Toonsi, Effat University, June-August 2016.
5. Gaetan Frusque, VSRP student, Grenoble university, May-August 2016, a paper under preparation.
6. Paul Bendevis, VSRP student, Waterloo university, Jan- April 2016, Outcome: accepted proceeding paper in IEEE conference and a journal paper under preparation.
7. Said Rahal, VSRP student, Imperial College of London, Aug 2015 -Feb 2016.
8. Jiayu Zhang, VSRP student, Cambridge University, KAUST, July- Dec 2015. Outcome: a conference paper accepted at ISMRM 2016 and an accepted journal paper in NMR in Biomedecine Journal.
9. Omar Altoaimi, KGSP Student, University of Washington (ME), Aug-Sept 2015.
10. Peter Richard Olejnik, VSRP student, Rose-Hulman Institute of Technology, March-Aug 2015.
11. Saeed Surki, Internship, SRSI program, KAUST, June-July 2014.
12. Alyazeed Basyoni, KGSP student, Summer 2014.
13. Abdullah Alghamdi, Internship, SRSI program, KAUST, June-July 2014.

14. Hakim Arabi, Internship SUPAERO Toulouse, July to August 2012. Outcome: a paper presented at American Control Conference (ACC) 2013. Currently working at Schlumberger.
15. Samir Khelouat Polytechnic School of Algiers. Outcome: Paper presented at American Control conference (ACC) 2012 and another at international conference on systems and control, 2013.
16. Ammar Radwan, Supelec Paris, Spring and summer 2011. Outcome: conference PICOF 2012.

## UNIVERSITY SERVICE AND OUTREACH

### University Committees

- Member of Electrical Engineering qualifying exam committee at KAUST (2016-2017)
- Chair of the admission committee at KAUST (2011-2013)
- Member of the admission committee at KAUST (2010-2011)

### Outreach

- Conducted qualifier exams for Mechanical Engineering and Earth Science programs
- Reviewed AMCS admissions
- Mentored KGSP and SRSI students
- Promoted collaborations with Saudi universities and institutions: Prof. Ali AlMatouq from Prince Sultan University ( a project submitted to KACST and a patent) - King Abdullah Medical Imaging center - Co-PI in three projects in the KAUST-KFUPM initiative
- Served as poster competition jury during Winter Enrichment Program 2013, 2014
- Participated at the Springboard program as guest speaker 2015, 2016 ( aims to help Thuwal's women to realize their potential, increase their confidence and self-esteem, making them better at problem solving and to make them more efficient in setting personal and professional goals)

**Scientific Committees**

- Scientific program committee of Differential Equations: Theory, Methods and Applications, 2018.
- Technical program committee of the 3rd International Conference on Automatic Control, 2017.
- Technical program committee of American Control Conference (ACC), 2017
- Program committee, International Conference on Systems and Control, 2015, 2013
- Best paper award chair, 4th International Conference on Systems and Control, 2015
- Scientific committee, IEEE International Conference on Control, Engineering and information Technology CEIT, 2015, 2016
- Scientific committee, 3rd International Symposium on Environmental Friendly Energies and Applications, 2014
- Attended the IFAC general assembly as an observer from Saudi Arabia, August 2014
- Panel of discussion on control in Middle East, American Control Conference (ACC), 2012
- Served as session chair in several conferences

**Conference Organization**

- Human-Machine Networks and Intelligent Infrastructure Conference, KAUST, 2015
- International workshop on Multiscale Modeling, Simulation and Inversion, KAUST, 2012, 2013, 2015
- Workshop in inverse problems for fractional equations and applications, Texas A&M, 2014

### Professional reviewing

- Reviewer for the 2016 Research Grant awards from the Human Frontier Science
- Reviewer for various journals including
  - IEEE transaction on automatic control
  - IEEE Transaction on biomedical engineering
  - IEEE Transaction on medical imaging
  - Systems and control letters
  - Siam Scientific computing
  - Biomedical Signal Processing and Control
  - European journal for automated systems JESA
  - Inverse Problems in Science and Engineering
  - Journal of Visual Communication and Image representation
  - Mathematical Problems in Engineering
  - Digital Signal Processing Journal
- Reviewer for various conferences including
  - IEEE Conference on Decision and Control (CDC)
  - American Control Conference (ACC)
  - European Control Conference (ECC)
  - IFAC Conferences
  - Fractional derivatives and applications conference
  - Mediterranean Conference on Control and Automation
  - IEEE Multiconference on systems and control
  - International Conference on Systems and Control
- Served as external examiner for the PhD defense of Fatima Taousser at University of Valenciennes/University of Sidi Belabess and the PhD proposal defense of Nadine Hajj from American University of Beirut (AUB)