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# Lazaros Moysis

## PhD, Aristotle University of Thessaloniki



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[https://www.researchgate.net/profile/Lazaros\\_Moysis](https://www.researchgate.net/profile/Lazaros_Moysis)



<https://scholar.google.gr/citations?user=gIV3aJcAAAAAJ&hl=en>



<https://publons.com/researcher/1683481/lazaros-moysis/peer-review/>



<https://www.linkedin.com/in/moysislazaros/>

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### Research Interests

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- Linear Control Systems
- Mathematical Modelling
- Descriptor Systems
- Chaotic Systems
- Chaos Synchronization
- Applications of chaos in:
  - Secure Communications
  - Random Number Generators
  - Image Encryption
  - Area Exploration

### Current Position

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2019 - 2022 Post-Doctoral Researcher, Laboratory of Nonlinear Systems, Circuits & Complexity, Physics Department, Aristotle University of Thessaloniki, Greece.

### Education & Training

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2017-2018 Service in the Greek Army. Duration: 9 months.

2013-2017 **PhD**

Dissertation: **Modeling, Reachability and Observability of Linear Multivariable Discrete Time Systems.**

Department of Mathematics, Aristotle University, Thessaloniki, Greece.

Supervisor: Professor N. P. Karampetakis.

2011-2013 **Master of Science**

**Theoretical Computer Science and Systems & Control Theory.**

Dept. of Mathematics, Aristotle University of Thessaloniki.

GPA: **9.8/10 Excellent.**

2006-2011 **Bachelor Degree in Mathematics**

Dept of Mathematics, Aristotle University of Thessaloniki.

GPA: **6.88/10 Very Good (top 20%).**

2003-2006 4<sup>th</sup> Lyceum of Larisa.

GPA: **19.00 Excellent.**

## Papers Published in International Journals

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- [1] Petavratzis, E., **Moysis, L.**, Volos, C., Nistazakis, H., Muñoz-Pacheco, J. M., & Stouboulos, I. (2020). Chaotic Path Planning for Grid Coverage Using a Modified Logistic-May Map. *Journal of Automation, Mobile Robotics and Intelligent Systems*, 14(2). (IF: ---, H-index: 6, Rank: Q4).
- [2] Takhi, H., Kemih, K., **Moysis, L.**, & Volos, C. (2020). Passivity based sliding mode control and synchronization of a perturbed uncertain unified chaotic system. *Mathematics and Computers in Simulation*. (IF: 1.62, H-index: 72, Rank: Q2).
- [3] **Moysis, L.**, Gupta, M. K., Mishra, V., Marwan, M., & Volos, C. (2020). Observer design for rectangular descriptor systems with incremental quadratic constraints and nonlinear outputs — Application to secure communications. *International Journal of Robust and Nonlinear Control*. (IF: 3.503, H-index: 99, Rank: Q1).
- [4] Volos, C., Sourailidis, D., **Moysis, L.**, Stouboulos, I. (2020). Antimonotonicity, Crisis and Route to Chaos in a Tumor Growth Model. Accepted for publication as Book Chapter in Handbook of Research on Modeling, Analysis, and Control of Complex Systems. IGI Global (Expected release date, December 2020).  
<https://www.igi-global.com/book/handbook-research-modeling-analysis-control/253254>
- [5] **Moysis, L.**, Azar, A., Tutueva, A., Butusov, D., Volos, C. (2020). Discrete Time Chaotic Maps with Application to Random Bit Generation. Accepted for publication as Book Chapter in Handbook of Research on Modeling, Analysis, and Control of Complex Systems. IGI Global (Expected release date, December 2020). <https://www.igi-global.com/book/handbook-research-modeling-analysis-control/253254>
- [6] **Moysis, L.**, Tutueva, A , Volos, C , Butusov, D . (2020). A Chaos Based Pseudo-Random Bit Generator Using Multiple Digits Comparison. *Chaos Theory and Applications*, 2 (2), 58-68. (IF: ---, H-index: ---, Rank: ---). Just published: <https://dergipark.org.tr/en/pub/chaos/issue/54264/756229>
- [7] Gerontitis, D., **Moysis, L.**, Stanimirovic, P., Katsikis, V., & Volos, C. (2020). A Varying-Parameter Finite-Time Zeroing Neural Network for Solving Linear Algebraic Systems. *Electronics Letters*. DOI: 10.1049/el.2019.4099 (IF: 1.343, H-index: 142, Rank: Q2)
- [8] **Moysis, L.**, Tutueva, A., Volos, C., Butusov, D., Munoz-Pacheco, J. M., & Nistazakis, H. (2020). A Two-Parameter Modified Logistic Map and Its Application to Random Bit Generation. *Symmetry*, 12(5), 829. (H-index: 36, Rank: Q2)

- [9] **Moysis, L.**, Petavratzis, E., Marwan, M., Volos, C., Nistazakis, H., & Ahmad, S. (2020). Analysis, Synchronization, and Robotic Application of a Modified Hyperjerk Chaotic System. *Complexity*, 2020. (H-index: 52, Rank: Q1)
- [10] **Moysis, L.**, Volos, C., Jafari, S., Munoz-Pacheco, J. M., Kengne, J., Rajagopal, K., & Stouboulos, I. (2020). Modification of the Logistic Map Using Fuzzy Numbers with Application to Pseudorandom Number Generation and Image Encryption. *Entropy*, 22(4), 474. (H-index: 61, Rank: Q2)
- [11] Khalaf, A. J. M., Abdolmohammadi, H. R., Ahmadi, A., **Moysis, L.**, Volos, C., & Hussain, I. (2020). Extreme multi-stability analysis of a novel 5D chaotic system with hidden attractors, line equilibrium, permutation entropy and its secure communication scheme. *European Physical Journal - Special Topics*, 229 (6-7), 1175-1188. (H-index: 70, Rank: Q2)
- [12] Takhi, H., Kemih, K., **Moysis, L.**, & Volos, C. (2020). Passivity based control and synchronization of perturbed uncertain chaotic systems and their microcontroller implementation. *International Journal of Dynamics and Control*, 1-18. (H-index: 16, Rank: Q2)
- [13] **Moysis, L.**, Petavratzis, E., Volos, C., Nistazakis, H., & Stouboulos, I. (2020). A chaotic path planning generator based on logistic map and modulo tactics. *Robotics and Autonomous Systems*, 124, 103377. (H-index: 109, Rank: Q1)
- [14] Petavratzis, E. K., Volos, C. K., **Moysis, L.**, Stouboulos, I. N., Nistazakis, H. E., Tombras, G. S., & Valavanis, K. P. (2019). An Inverse Pheromone Approach in a Chaotic Mobile Robot's Path Planning Based on a Modified Logistic Map. *Technologies*, 7(4), 84. (H-index: ---, Rank: ESCI)
- [15] **Moysis, L.**, Volos, C., Pham, V. T., Goudos, S., Stouboulos, I., Gupta, M. K., & Mishra, V. K. (2019). Analysis of a Chaotic System with Line Equilibrium and Its Application to Secure Communications Using a Descriptor Observer. *Technologies*, 7(4), 76. (H-index: ---, Rank: ESCI)
- [16] **Moysis, L.**, & Mishra, V. K. (2019). Existence of reachable and observable triples of linear discrete-time descriptor systems. *Circuits, Systems, and Signal Processing*, 38(3), 1086-1098. (H-index: 49, Rank: Q2)
- [17] **Moysis, L.**, Kafetzis, I., & Politis, M. (2018). Analysis and Control of a Dynamical Model for HIV Infection With One or Two Inputs. Book chapter in *Advances in System Dynamics and Control* (pp. 357-381). IGI Global.
- [18] **Moysis, L.**, & Karampetakis, N. (2018). Algebraic methods for the construction of Algebraic-Difference equations with desired behavior. *Electronic Journal of Linear Algebra*, 34(1), 1-17. (H-index: 26, Rank: Q3)
- [19] **Moysis, L.**, Karampetakis, N., & Antoniou, E. (2017). Observability of linear discrete-time systems of algebraic and difference equations. *International Journal of Control*, 1-17. (H-index: 111, Rank: Q1)

- [20] **Moysis, L.**, Azar, A. T., Kafetzis, I., Tsiaousis, M., & Charalampidis, N. (2017). Introduction to Control Systems Design Using Matlab. *International Journal of System Dynamics Applications (IJSDA)*, 6(3), 130-170. (H-index: --- Rank: ESCI)
- [21] **Moysis, L.**, & Karampetakis, N. P. (2017). Construction of algebraic and difference equations with a prescribed solution space. *International Journal of Applied Mathematics and Computer Science*, 27(1), 19-32. (H-index: 45, Rank: Q2)
- [22] **Moysis, L.**, & Azar, A. T. (2017). New Discrete Time 2D Chaotic Maps. *International Journal of System Dynamics Applications (IJSDA)*, 6(1), 77-104. (H-index: ---, Rank: ESCI)
- [23] **Moysis, L.**, Pantelous, A. A., Antoniou, E., & Karampetakis, N. P. (2017). Closed form solution for the equations of motion for constrained linear mechanical systems and generalizations: An algebraic approach. *Journal of the Franklin Institute*, 354(3), 1421-1445. (H-index: 77, Rank: Q1)
- [24] **Moysis, L.**, Kafetzis, I., & Politis, M. (2016). Analysis of a Dynamical Model for HIV Infection with One or Two Inputs. *International Journal of System Dynamics Applications (IJSDA)*, 5(4), 83-100. (H-index: --- Rank: ESCI)
- [25] **Moysis, L.**, & Karampetakis, N. P. (2016). Reachability of discrete time ARMA representations. *IMA Journal of Mathematical Control and Information*, dnw016. (H-index: 34, Rank: Q2)

## Papers Presented in International Conferences

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- [1] **Moysis, L.**, Volos, C., Stouboulos, I., Goudos, S., Çiçek, S., Pham, V. T., & Mishra, V. K. (2020, September). A Novel Chaotic System with Application to Secure Communications. In *2020 9th International Conference on Modern Circuits and Systems Technologies (MOCASST)* (pp. 1-4). IEEE.
- [2] Petavratzis, E., **Moysis, L.**, Volos, C., Nistazakis, H., Muñoz-Pacheco, J. M., & Stouboulos, I. (2020, September). Motion Control of a Mobile Robot Based on a Chaotic Iterative Map. In *2020 9th International Conference on Modern Circuits and Systems Technologies (MOCASST)* (pp. 1-4). IEEE.
- [3] Giakoumis, A., Androutsos, N. A., Volos, C. K., **Moysis, L.**, Nistazakis, H. E., & Tombras, G. S. (2020, September). A Chaotic Circuit with Bi-Color LED as a Nonlinear Element. In *2020 9th International Conference on Modern Circuits and Systems Technologies (MOCASST)* (pp. 1-4). IEEE.
- [4] Moysis, L., Petavratzis, E., Volos, C., Nistazakis, H., Stouboulos, I., & Valavanis, K. (2020, September). A Chaotic Path Planning Method for 3D Area Coverage Using Modified Logistic Map and a Modulo Tactic. In *2020 International Conference on Unmanned Aircraft Systems (ICUAS)* (pp. 220-227). IEEE.

- [5] **Moysis, L.**, Volos, C., Takhi, H., Kemih, K., Goudos, S., & Nistazakis, H. E. (2019). Analysis, Synchronization and Microcontroller Implementation of a Generalized Hyperjerk System, with Application to Secure Communications Using a Descriptor Observer. In *2019 Panhellenic Conference on Electronics & Telecommunications (PACET)* (pp. 1-4). IEEE.
- [6] Zouad, F., Machkour, N., Kemih, K., **Moysis, L.**, Volos, C., & Stouboulos, I. (2019). Predictive Control of a Fractional Order Delayed Chaotic System with Circuit Implementation. In *2019 Panhellenic Conference on Electronics & Telecommunications (PACET)* (pp. 1-4). IEEE.
- [7] **Moysis, L.**, Volos, C., Pham, V. T., Goudos, S., Stouboulos, I., & Gupta, M. K. (2019). Synchronization of a Chaotic System with Line Equilibrium using a Descriptor Observer for Secure Communication. In *2019 8th International Conference on Modern Circuits and Systems Technologies (MOCASST)* (pp. 1-4). IEEE.
- [8] **Moysis, L.**, Kafetzis, I., & Karampetakis, N. P. (2018). Reachability and controllability of discrete time descriptor systems using the Weierstrass decomposition. In *2018 5th International Conference on Control, Decision and Information Technologies (CoDIT)* (pp. 379-384). IEEE.
- [9] **Moysis, L.**, & Karampetakis, N. P. (2016). Reachability of discrete time causal ARMA representations. In *Control and Automation (MED), 2016 24th Mediterranean Conference on* (pp. 170-175). IEEE.
- [10] **Moysis, L.**, & Karampetakis, N. P. (2014). On the modeling of discrete time Auto-Regressive representations. In *Control, Decision and Information Technologies (CoDIT), 2014 International Conference on* (pp. 381-386). IEEE.
- [11] **Moysis, L.**, & Karampetakis, N. P. (2014). Modeling of discrete time auto-regressive systems with given forward and backward behavior. In *Control and Automation (MED), 2014 22nd Mediterranean Conference of* (pp. 139-144). IEEE.

## Papers presented in Greek Conferences

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- [1] **Moysis, L.** (2018). Dynamic Systems and Control Theory – A project for Secondary Education. *10<sup>th</sup> International Week Dedicated to Maths*, Thessaloniki.
- [2] Kafetzis, I., **Moysis, L.** (2017). Inverted Pendulum: A system with innumerable applications. *9<sup>th</sup> International Week Dedicated to Maths*, Thessaloniki.
- [3] **Moysis, L.**, Kafetzis, I., & Politis, M. (2016). A dynamic model for HIV infection. *Panhellenic conference for msc and phd new holders in mathematics*. Ioannina.

- [4] **Moysis, L.,** Karampetakis, N.P. (2016). Constructing systems of difference and algebraic equations with prescribed forward and backward solutions. *Panhellenic conference for msc and phd new holders in mathematics.* Ioannina.
- [5] **Moysis, L.,** Kafetzis, I., & Politis, M. (2016). A dynamic model for HIV infection (in Greek). *8<sup>th</sup> International Week Dedicated to Maths,* Thessaloniki.
- [6] **Moysis, L.** (2015). Good, Bad and Arrogant: Cinematic Portrayals of Scientists in Horror Movies. *7<sup>th</sup> International Week Dedicated to Maths,* Thessaloniki.

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## Books and Technical Reports

- [1] **Moysis L.,** Tsolakis Ch. (2020). *Latex – Fast and Easy (in Greek).* Sofia Publications. ISBN: 978-960-633-021-6. Code in Eudoxos: 94700550. <https://www.esofia.net/vivlio/pliroforiki/latex>
- [2] **Moysis, L.** (2018). [Introduction to Computer Aided Geometric Design - A student's companion with Matlab examples.](#) Available through ResearchGate.
- [3] **Moysis, L.** et al. (2015). [An Introduction to Control Theory Applications with Matlab.](#) Available through ResearchGate.
- [4] **Moysis L.,** Tsolakis Ch. et al. (2014). [An Introduction to Latex for Students \(Greek\).](#) Available through ResearchGate.
- [5] **Moysis, L.** (2016). Balancing a double inverted pendulum using optimal control and Laguerre functions. *Aristotle University of Thessaloniki, Greece.*

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## Books Translated

- Member of the translator team for the Greek version of [“The Data Science Handbook: Advice and Insights from 25 Amazing Data Scientists”](#).

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## Guest Editing in Special Issues

- Guest editor in the Special Issue [“Recent Advances in Chaotic Systems and Their Security Applications”](#) in *Electronics*.
- Guest editor in the Special Issue [“Recent Advances in Synchronization and Control of Chaotic Systems and their Engineering Applications”](#) in *Mathematical Problems in Engineering*.
- Guest editor in the Special Issue [“Recent Advances in Modeling, Analysis, and Synchronization of Chaotic Systems”](#) in *Complexity*.

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**Google Scholar Citations:** 122

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## Teaching Experience

- 2019-2020 Teaching Associate, Department of Industrial Engineering and Management, International Hellenic University, under the NSRF program EΔBM96 for young Doctorates. Courses Taught:
- Automatic Control Systems I, 5<sup>th</sup> Semester.
  - Advanced Control Systems, 7<sup>th</sup> Semester.
- 2018-2019 Teaching Associate, Department of Mathematics, Aristotle University of Thessaloniki, under the NSRF program EΔBM82 for young Doctorates. Courses Taught:
- Classic Control Theory, 7<sup>th</sup> Semester.
  - Fuzzy Sets, 8<sup>th</sup> Semester.
  - Computational Geometry, 8<sup>th</sup> Semester
- 2014-2017 *Assistant*, Undergraduate Courses: Classic Control Theory, Modern Control Theory. Dept. of Mathematics, Aristotle University, Thessaloniki. Conducting an optional workshop on using *Matlab* Software. (8 weeks, every winter semester for classic and 1 week every spring semester for modern control theory).
- 2017 Seminar on the use of Latex, taught during the 9<sup>th</sup> International week dedicated to Maths, Thessaloniki, in collaboration with I. Kafetzis. I also taught the seminar in Larisa, in collaboration with the Hellenic Mathematical Society's branch of Larisa.
- 2014-2016 *Seminars* for undergraduate and postgraduate students: *Typesetting mathematical texts with Latex*. Aristotle University, Thessaloniki. (3 weeks, every spring semester). In collaboration with I. Kafetzis. Creation of open course: <https://opencourses.auth.gr/courses/MATH115/>
- 2013 *Teaching Assistant*, Undergraduate Course: Classic Control Theory. Conducting the workshop on using the *Matlab* Software. (6 weeks).
- 2012 - 2017 Provide tutorial lessons to secondary school students.

## Research Related Activities

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- Reviewing Peer reviewer for the following journals and conferences:
- Acta Polytechnica
  - Asian Journal of Control
  - Axioms
  - Complexity
  - Computation
  - Electronics
  - Entropy
  - IMA Journal of Mathematical Control and Information
  - International Journal of Systems Science
  - International Journal of Dynamics and Control
  - International Journal of System
  - Journal of Electrical and Computer Engineering
  - Kybernetika
  - Mathematical Problems in Engineering
  - Mathematics
  - Symmetry
  - The European Physical Journal: Special Topics
  - CoDiT 18, CoDiT 19, CoDiT 20
  - ASCC 19
  - MED 19, MED 20
  - Mathematical Reviews (28 papers, 2 books)

- Dynamics Applications ➤ ZBMath (3 papers, 8 books).
- Iranian Journal of Science and Technology
- Journal of the Franklin Institute

Prime Mag. Columnist for the alumni journal of the Mathematics Department of AUTH, [The Prime Magazine](#). Topics include introductory concepts of control theory and dynamical systems, or biographies, with the aim of introducing students to the relevant field.

2013-2015 *Participant* in the program “*Numerical and Symbolic Polynomial methods for Mathematical Systems Theory*” (under principal investigator prof. E. Antoniou, Program Archimedes III, no. 365 proposal, acronym NSPMST) as an *unfunded member of the writing team*.

## Scholarships & Awards

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- 2019-2021 Scholarship for Post-doctoral studies granted by the State Scholarships Foundation (I.K.Y.) of Greece, under program “Reinforcement of Postdoctoral Researchers—2nd Cycle” (MIS-5033021).
- 2014 Scholarship of excellence for doctorate studies granted by Aristotle University of Thessaloniki. Duration: 10 months.
- 2012-2013 Scholarship granted by the State Scholarships Foundation (I.K.Y.) of Greece for my 3<sup>rd</sup> semester of Master Studies, under program “Education and Life Long Learning” - ESF (2007-2013). Duration: 6 months.
- 2012 Scholarship for Master students, for providing academic services to the faculty. Granted by Aristotle University, Thessaloniki. Duration: 3 months.
- 2006 Enrolment award for ranking 3<sup>rd</sup> at the 2006-2007 undergraduate enrollment year. Department of Mathematics, Aristotle University of Thessaloniki.

## Language Skills

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- Greek Native.
- English Excellent Level
- *IELTS* (International English Language Testing System): Score: 8 (Eight).
  - *Certificate of Proficiency in English*, University of Michigan.
- French Good Level
- *Delf 1er Degre*, Ministère de l'Éducation National.

## Specialization Workshops & Courses

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- 2020 Online Coursera Course: *University Teaching*. The University of Hong Kong.  
 Online Coursera Course: *Learning to Teach Online*. UNSW Sydney.



Online Coursera Course: *Advanced Instructional Strategies in the Virtual Classroom*. University of California, Irvine.

Online Coursera Course: *Teaching Science at University*. University of Zurich

IEEE Continuing Education Courses (Each equivalent to 3 Professional Development Hours):

- *Introduction to Type-2 Fuzzy Sets and Systems.*
- *Cryptography Fundamentals.*
- *Learning Objectives: A Key to Better Teaching.*
- *Motivation in the College Classroom.*
- *Managing Student Teams.*
- *Writing Effective Multiple Choice Exams for Engineering and Science.*

2015-2017 As a PhD student I successfully completed the following MSc courses at the Mathematics Department:

- *Model Predictive Control.*
- *Geometric Control Theory.*
- *Algorithms & Complexity.*

2016 Online Coursera Course: *Control of Mobile Robots*. Georgia Institute of Technology.

Online Iversity Course: *Modelling and Simulation using Matlab*. RheinMain University of Applied Sciences.

2015 Online Coursera Course: *An Introduction to Programming with Matlab*. Vanderbilt University.

2014 Seminar: *System Modeling and Hardware Prototyping with MATLAB and Simulink*. Mentor Hellas, Thessaloniki.

Workshop: *Statistical analysis and mathematical modeling using MATLAB*. Mentor Hellas, Thessaloniki.

MATLAB Workshop: *Analysis of energy systems*. Mentor Hellas, Thessaloniki.

Online Coursera Course: *University Teaching 101*. Johns Hopkins University.