Carllos Eduardo Holanda

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Personal

Name: Carllos Eduardo Alves de Holanda.

Birthplace: Maceió, Alagoas, Brazil.

Education

B. Sc. in Chemical Engineering at Universidade Federal de Alagoas, Brazil, 2010-2015.

M. Sc. in Mathematics at Universidade Federal de Alagoas, Brazil, 2016-2017, under the supervision of Krerley Oliveira.

PhD. in Mathematics (passed with distinction) at Instituto Superior Técnico, Universidade de Lisboa, Portugal, 2018-2022, under the supervision of Luis Barreira.

Research interests

Ergodic theory, dynamical systems, dimension theory, multifractal analysis, thermodynamic formalism, difference and differential equations, machine learning theory and natural language processing.

Professional Experience

Scientific initiation scholarship in Mathematics at Universidade Federal de Alagoas. Project: Ergodic Theory of Number Expansions, under the direction of Prof. Krerley Oliveira, 2012.

Teaching Assistant of the course Physics 2 at Universidade Federal de Alagoas, 2012.

Teaching Assistant of the course Trasport Phenomena 2 (Chemical Engineering) at Universidade Federal de Alagoas, 2013.

Scientific initiation scholarship in Mathematics at Universidade Federal de Alagoas. Project: Numbers and Ergodic Theory, under the direction of Prof. Krerley Oliveira, 2013.

Visiting student of Summer School at IMPA - Instituto de Matematica Pura e Aplicada, Brazil, 2014.

Visiting student at CSU - Colorado State University, Science without Borders Scholarship, United States of America, 2014-2015.

Visiting student of Summer School at IMPA - Instituto de Matematica Pura e Aplicada, Brazil, 2017.

Member of Laboratory of Statistics and Data Science at Universidade Federal de Alagoas, Brazil, 2022.

Reviewer for Mathematical Reviews (AMS).

Talks presented and participation in events

Presentation of the work *Numbers and Ergodic Theory* in the Annual Academic Congress at Universidade Federal de Alagoas, Brazil, 2012.

Presentation of the work *Perron-Frobenius Theorem with Hyperbolic Metric and Applications in Cycling Strategy* in the Annual Academic Congress at Universidade Federal de Alagoas, Brazil, 2013.

Van der Waerden's theorem via Birkhoff's multiple recurrence, presented in the Dynamical Systems Seminar at Universidade Federal de Alagoas, Brazil, 15-12-2016.

Applications of ergodic theory to number theory, presented in the Lismath Seminar, Instituto Superior Técnico, Universidade de Lisboa, Portugal, 10-10-2018.

Attendance to the workshop Thermodynamical Formalism, Ergodic Theory and Geometry at University of Warwick, Coventry, United Kingdom, from 22-07-2019 to 26-07-2019.

Presentation of the work *Nonadditive thermodynamic formalism and multifractal analysis for flows* in Matfest, Universidade Federal de Alagoas, Brazil, held online on 04-12-2020.

Presentation of the work *Multifractal analysis for flows* in the Lisbon Young Mathematicians Conference, Portugal, held online on 24-4-2021.

Attendance to the Encontro Nacional da Sociedade Portuguesa de Matemática 2021 (ENSPM2021), Portugal, held online from 12-07-2021 to 16-07-2021.

Nonadditive thermodynamic formalism and multifractal analysis for flows, presented in the Lismath Seminar, Instituto Superior Técnico, Universidade de Lisboa, Portugal, held online on 21-04-2022.

Nonlinear thermodynamic formalism, presented in the Dynamical Systems Seminar at Universidade Federal de Alagoas, Brazil, 06-05-2022.

Research

Published papers

1. *Nonadditive topological pressure for flows*, Nonlinearity **33** (2020), 3370-3394.
   (L. Barreira and C. Holanda).
2. *Equilibrium and Gibbs measures for flows*, Pure and Applied Functional Analysis **6** (2021).
   (L. Barreira and C. Holanda).
3. *Hyperbolicity of delay equations via cocycles*, Journal of Difference Equations and Applications (2021), 1-24.
   (L. Barreira, C. Holanda and C. Valls).
4. *Almost additive multifractal analysis for flows*, Nonlinearity **34** (2021), 4283-4314.
   (L. Barreira and C. Holanda).
5. *Dimension spectra for flows: future and past*, Nonlinear Anal. Real World Appl. **65** (2022), 103497.
   (L. Barreira and C. Holanda).
6. *Higher-dimensional nonlinear thermodynamic formalism*, J. Stat. Phys. **187**, 18 (2022).
   (L. Barreira and C. Holanda).
7. *Nonlinear thermodynamic formalism for flows*, Dynamical Systems (2022).
   (L. Barreira and C. Holanda).

Unpublished works

1. *Detemination of ideal states for cubic equations of state*, B.Sc. dissertation, Chemical Engineering, 2015.
2. *Thermodynamic formalism and the Ising model*, M.Sc. dissertation, Mathematics, 2017.
3. *Homogeneous dynamics: an introduction to Ratner's theorems for unipotent flows*, notes, 2018.
4. *Nonadditive thermodynamic formalism and multifractal analysis for flows*, PhD. thesis, Mathematics, 2022.

Ongoing projects

1. *Physical equivalence of nonadditive families of potentials*;
2. *Word embeddings in hyperbolic spaces*;
3. *A Livsic theorem for nonadditive sequences of functions*;
4. *Nonlinear multifractal analysis*.

Awards and titles

1st place on the Chemical Engineering entrance examination for the Universidade Federal de Alagoas, 2010.

Languages

Portuguese: native speaker.

English: good command, good working knowledge.