Lauro
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PhD. Mathematics

CONTACT

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LinkedIn

LANGUAGES

Native

Spanish

Conversational

English

ABOUT ME

I consider myself a curious, skilled and easily-adapted person, with deep knowledge in applied mathematics and scientific.

I am interested in the study of phase transitions in complex materials, mainly the formation, stability and dynamics of microstructure.

EDUCATION

PhD Mathematics

Instituto de Matemáticas – UNAM 2016-2020

phase transitions Minimizing structures of the elastic energy in linear geometric theory for thin film regime

Msc. Mathematics

Instituto de Matemáticas – UNAM 2014-2016

Transiciones de fase en teoría geométrica lineal de película delgada

Bsc. Physics

Facultad de ciencias – UNAM 2005-2010

Existence of annular vortices with boundaries close to internal streamlines of Hill's spherical vortex

CURRENT JOB

Postdoctoral position

Instituto de Investigaciones en Matemáticas Aplicadas y Sistemas – UNAM 2022-2024

Variational analysis and stability of coherent structures in continuum mechanics

RESEARCH INTERESTS

- Calculus of variations
- Differential Equations
- Analysis
- Probability and Statistics
- Data Science

SOFTWARE

- 8/10 Python
- 7/10 Arduino
- 6/10 Matlab
- 6/10 R

PUBLICATIONS

Capella, A., Melcher C., Morales, L. & Plaza R. *Nonlinear stability of static Néel Walls in ferromagnetic thin films.*
Preprint (2023).
https://arxiv.org/abs/2309.04432

Capella, A., Morales, L. *On the quasiconvex hull for a three-well problem in two dimensional linear elasticity.*
Calc. Var. 61, 100 (2022).
https://doi.org/10.1007/s00526-022-02209-4

Capella, A., Morales, L. *On the Symmetric Lamination Convex and Quasiconvex Hull for the Coplanar n-Well Problem in Two Dimensions.*
J Elast 148, 27–54 (2022).
https://doi.org/10.1007/ s10659-021-09878-w

TALKS

Nonlinear stability of coherent structures in PDEs.
CIMAT - Guanajuato
Noviembre -2023. (language: Spanish)

Nonlinear stability of magnetic Néel walls in thin film
IIMAS-UNAM Ciudad de México: "Coloquio de matemáticas y mecánica"
Septiembre-2023 (language: Spanish)

Nonlinear stability of magnetic Néel walls in thin film
ITAM Ciudad de México: "SIAM sección México"
Julio-2023 (language: Spanish)

Some Results on the Quasiconvex Hull for a n-well Problem in 2D Under Geometrically Linear Elastic Regime.
MPI - Leipzig Alemania: "AG seminar Arbeitsgemeinschaft Applied Analysis"
Diciembre-2019 (language: English)

The Quasiconvex Hull for a Three-well problem in 2D under Geometrically Linear Elastic Regime.
CIMAT – Guanajuato: "12th Americas Conference on Differential Equations and Nonlinear Analysis"
Diciembre - 2019 (language: English)

Microstructure in alloys and the n-well problem in geometrically linear elasticity.
UAM-I Ciudad de México: "Seminario de Análisis Matemático"
Noviembre – 2018 (language: Spanish)

REFERENCIAS

Dr. Antonio Capella Kort

Instituto de Matemáticas
UNAM

capella@im.unam.mx

Dr. Ramón G. Plaza Villegas

Instituto Investigaciones en Matemáticas y Sistemas
UNAM

plaza@mym.unam.mx

Dr. Manuel Domínguez de la Iglesia

Instituto de Matemáticas
UNAM

mdi29@im.unam.mx

AWARDS & DISTINTIONS

2022-2024 CONACYT – *SNII candidacy.*

2022-2024 CONACYT –P*osdoctoral position by Mexico.*

2016-2020 CONACYT - *Doctoral Scholarship.*

2014-2016 CONACYT - *Master Scholarship.*

2012-2013 CONACYT -*Research assistant.*

TEACHING

Subject Instructor /Facultad de ciencias – UNAM / 2019-2023

- Differential and Integral Calculus I-IV

Subject Instructor /Escuela Nacional Preparatoria – UNAM / 2022-2023

- Mathematics IV, V, VI areas 2 y 3

On-line Instructor / Matemáticas – UnADM / 2021-2022

- Introduction to Matematical thinking
- Statistics I
- Multivariable Calculus I

Teacher Asistant /Facultad de ciencias – UNAM / 2010-2017

- Differential and Integral Calculus I-IV
- Complex Variable
- Fourier Analysis
- Estochastic Processes I y II
- Electromagnetism I

POSTERS

Quasiconvex hull for three wells in 2D under Geometrically linear Elastic Regime /CNA Pittsburgh PA / Marzo 2019
"Mathematical Models for Pattern Formations"

Rigidity and non-Rigidity for Cubic-to-Tetragonal Phase Transition in GL Thin Film Theory / PIRE-CNA Pittsburgh PA / Junio - 2016
"2016 Summer School: New Frontiers in Nonlinear Analysis for Materials"

Rigidity results for cubic-to-tetragonal phase transition in geometrically linear thin-film theory / IMA Eugene OR / Octubre 2015
"IMA workshop: Mathematics and Mechanics in the 22nd Century: seven decades and counting..."

CONGRESS ATTENDANCE

September 2023 - *Potential Theory Workshop: Intersections in Harmonic Analysis, Partial Differential Equations and Probability.* CIMAT-Guanajuato México.

July 2023 - *Reunión anual SIAM Sección México: Building Bridges for Interdisciplinary Research*. ITAM-Ciudad de México.

May 2021 - *Integrative Think Tank on Environmental shock resilience in Mexico; data, models and policy.* CIMAT-Guanajuato México.

May 2019 - *Workshop on differential equations and calculus of variations: The Monge-Ampere equation.* CIMAT-Guanajuato México.

March 2019 - *Mathematical Models for Pattern Formations.* CNA Pittsburgh PA.

December 2018 - *Workshop on Multiscale Models: Theory and Applications.* CIMAT-Guanajuato México.

May 2018 - BUC13-GUQ2018: *Workshop on Uncertainty Quantification.* CIMAT-Guanajuato México.

September 2016 - CMO-BIRS 16w5021: *Mathematical Problems of Orientationally Ordered Soft Solids*. CMO-Oaxaca México.

June 2016 - PIRE-CNA 2016 Summer School: *New Frontiers in Nonlinear Analysis for Materials.* CNA Pittsburgh PA.

October 2015 - IMA workshop: *Mathematics and Mechanics in the 22nd Century: seven decades and counting...* Eugene OR.

OTHER PROYECTS

Estimation of water consumption in Mexico city / ACCUBO-SACMEX-UNAM / Marzo 2022 - Agosto 2022

Dr. Antonio Capella, Mat. Sergio Fernández and myself developed predictive models of water consumption at different levels of aggregation at Mexico city.
The main activities were:
Model development:

- Bayesian Gaussian mixture regressor to estimate meter's mechanical tear.
- Predictive variable selector for predictive models.
- Classical and Bayesian regressors for per-capita consumption.

Developed software:

- Cleaning and coupling of databases.
- Address' splitting
- Implementation, training and selection of regressors.
- Final user webapp