Fredy Antonio Vides Romero

Curriculum Vitae

Education

Ph.D. in Mathematics *specialized in Operator Theory and Algebraic Modeling* (with Distinction), *The University of New Mexico*, Albuquerque, NM, USA.

B.Sc. Mathematical Engineering, *Universidad Nacional Autónoma de Honduras*, Tegucigalpa, Honduras.

Doctoral Dissertation

Title Toroidal Matrix Links: Local Matrix Homotopies and Soft Tori.

Advisor Prof. Dr. Terry A. Loring

Work Experience

Teaching Experience

Currently **Associate Professor**, *Department of Applied Mathematics*, UNAH, Tegucigalpa.

Research Experience

Currently **Principal Investigator**, *Scientific Computing Innovation Center/School of Mathematics and Computer Science*, UNAH, Tegucigalpa.
Project: Approximate Identification of Dynamical Systems with Symmetries, with ID number: PI-063-DICIHT, DICIHT/UNAH.

Previously **Adjunct Researcher**, *Scientific Computing Innovation Center/Department of Mathematics and Statistics*, UNAH/UNM, Tegucigalpa/Albuquerque.
Project: Emergent Topology and K-Theory of Matrix Models, with ID number: DMS1700102 National Science Foundation, USA.

Previously **Founder and Coordinator of the Scientific Computing Innovation Center**, *School of Mathematics and Computer Science*, UNAH, Tegucigalpa.

Previously **Research Assistant**, *Department of Mathematics and Statistics*, UNM, Albuquerque.
Project: Structured Operator Algebras for Physics, with ID number SF 208723, Simons Foundation USA.

Editorial Experience

Currently **Member of the International Scientific Committee**, *Academic Journal*, University of Costa Rica.
Revista Matemática: Teoría y Aplicaciones.

Professional Memberships

Currently **Member of the International Federation of Automatic Control**, *(IFAC)*.

Pedagogical Training

College Pedagogy and Didactics Course, *CAEU/OEI/UNAH*, Honduras-Spain.

Specific Teaching Experience

Courses taught: UNAH Tegucigalpa

- High performance programming (graduate), Mathematical Engineering Seminar (graduate), Applied Mathematical Analysis (graduate), Numerical Optimization (graduate), Mathematical Modeling (graduate), Automata theory, Dynamical Systems II, Numerical Linear Algebra, Topology, Normed Spaces, Geometry I, Geometry II, Discrete Mathematics, Complex Variables I, Numerical Analysis I, Partial Differential Equations, Linear Algebra, Computer Programming y Data Structures.

Courses taught: UNM Albuquerque

- Applied Linear Algebra for Engineering, Elements of Calculus I, Calculus I, Calculus III, and Advanced Calculus I.

Computational Skills

Advanced Level	Python, Julia, C++, MatLab, Linux, Octave, FreeFem++, CalculiX, FreeCAD, LaTeX.
Intermediate Level	MPI, OpenOffice, MS Windows, R.
Basic Level	Java, Fortran, HTML

Research Expertise

- Data-driven Cyber-Physical System Modeling
- Scientific Machine Learning
- Model Identification for Digital Twins
- Structured operator approximation
- Structured functional calculus
- Approximate joint diagonalization of structured matrices

Scientific Visits

Fall 2017 **Fields Institute for Research in Mathematical Sciences**, *University of Toronto*, Toronto, ON, Canada., Position: Visiting Scientist.
Project: Local Uniform Connectivity of Matrix Spheres.

Fall 2014 **Departmen of Mathematics**, *North Carolina State University*, Raleigh, NC, USA., Position: Visiting Scientist.
Project: Matrix Dynamical Systems in Numerical Linearl Algebra.

Summer 2014 **Erwin Schrödinger International Institute for Mathematical Physics**, *University of Vienna*, Vienna, Austria, Position: Visiting Scientist.
Project: Topological Phases of Quantum Matter.

Summer 2012 **Center for Symmetry and Deformation**, *Department of Mathematical Sciences*, University of Copenhaguen, Denmark, Position: Visiting Ph.D. Scholar.
Project: Noncommutative Lifting Theory and Semiprojectivity.

Selected Publications

Articles published or accepted on international journals

- F. Vides, E. Segura, C. Vargas. A Subspace Method for Time Series Anomaly Detection in Cyber-Physical Systems . IFAC-PapersOnLine, International Federation of Automatic Control and Elsevier, in press (2023).
- F. Vides. Computing Semilinear Sparse Models for Approximately Eventually Periodic Signals. IFAC-PapersOnLine, International Federation of Automatic Control and Elsevier, in press (2022).
- T. Loring, F. Vides. Computing Floquet Hamiltonians with Symmetries. Journal of Mathematical Physics 61, 113501 (2020); `https://doi.org/10.1063/5.0023028`
- F. Vides. On Cyclic Finite-State Approximation of Data-Driven Systems. IEEE Xplore 2019. Proceedings of CONCAPAN XXXIX, 2019.
- F. Vides. On Uniform Connectivity of Algebraic Matrix Sets. Banach J. Math. Anal., Vol. 13, No. 4, pp. 918-943. 2019.
- T. Loring; F. Vides. Local Matrix Homotopies and Soft Tori. Banach J. Math. Anal. Volume 12, Number 1 (2018), 167-190.
- T. Loring; F. Vides. Estimating Norms of Commutators. Exper. Math. 24(1):106-122, 2015.

Articles published or accepted on national journals

- F. Vides. Approximación de Grupos Unitarios de Schrödinger Representaciones Particulares de Sistemas Dinámicos Cuánticos de Dimensión Finita. Revista portal de la Ciencia, UNAH, 2011.
- F. Vides. Introducción al Cálculo Particular y la Dinámica de Universos Discretizables. Revista Ciencia y Tecnología. DICU-UNAH. Junio, 2009.
- F. Vides. Modelado Numérico de Movimiento Ondulatorio en Medios Heterogéneos No-Isotrópicos bajo Condiciones de Estabilidad Orbital. Revista Ciencia y Tecnología. DICU-UNAH. Noviembre, 2008.

Electronic Open Books

- F. Vides. Introducción a la Topología y la Teoría de Homotopía. Disponible en la dirección: `https://cadds-lab.github.io/Topology_and_Geometry.pdf`
- F. Vides. Métodos Numéricos y Modelación Computacional. Disponible en la dirección: `https://cadds-lab.github.io/MNMC.pdf`.

Conferences given

- 2022: A Subspace Method for Time Series Anomaly Detection in Cyber-Physical Systems. 4th IFAC Workshop on Cyber-Physical Human Systems. Houston, Texas.
- 2022: Computing Truncated Joint Approximate Eigenbases for Model Order Reduction. 10th Vienna International Conference on Mathematical Modelling. Vienna, Austria.

- 2022: Computing Semilinear Sparse Models for Approximately Eventually Periodic Signals. 10th Vienna International Conference on Mathematical Modelling. Vienna, Austria.
- 2022: Computing Sparse Semilinear Models for COVID-19 Related Processes. XXIII SIMMAC 2022. Costa Rica.
- 2022: Representación Neuronal de Operadores y Detección de Anomalías en Procesos Industriales. ECAMI 2022. Honduras - Costa Rica.
- 2022: Gemelos y Emprendimientos Digitales y su Potencial de Aplicación en la Industria Hondureña. ECAMI 2022. Honduras - Costa Rica.
- 2020: On Approximately Cyclic Model Order Reduction for Data-Driven Systems. XXII SIMMAC 2020. Costa Rica.
- 2020: On Algebraic Approximation of Time-Evolution Operators. XXII SIMMAC 2020. Costa Rica.
- 2020: Matrices y Sombras Dinámicas. IX COME UPNFM.
- 2020: Controladores Algebraicos Universales Ponderados en Identificación y Control de Dinámica Epidemiológica. Primero Congreso Virtual de Investigación Científica, UNAH.
- 2020: Dilatación y Control Algebraico de Sistemas Dinámicos. Congreso XXIV de Matemática Educativa Virtual. Universidad de San Carlos. Guatemala.
- 2020: Representación Cíclica Aproximada e Identificación de Sistemas Mecánicos. I Jornada Científica Big Data y Computación de Alto Rendimiento, Escuela de Física, UNAH.
- 2019: Control topológico de sistemas bilineales en deformación de elementos y materiales estructurales. Congreso Nacional de Ciencia, Tecnología e Innovación UNITEC/CEUTEC 2019.
- 2019: On Topologically Controlled Matrix Approximation. College Station. EE. UU.
- 2019: On Periodic Flows in Matrix Representations of $C(\mathbb{S}^1)$. COSy 2019. University of Regina. Regina. Canadá.
- 2019: On Cyclic Finite-State Approximation of Data Driven-Systems. IEEE CONCAPAN 2019. Guatemala.
- 2017: Particiones Ortogonales de la Unidad en Esferas Matriciales. Coloquio del Departamento de Ciencias Matemáticas. UPNFM. 2016.
- 2017: Uniform Local Path Connectivity of Matrix Spheres. Seminario de Álgebra de Operadores, Universidad de Toronto, Canadá.
- 2017: Aplicaciones de los Autómatas Cuánticos Finitos. Conferencia de Matemática. UTH. 2017.
- 2017: El Lema de Urysohn y la Estructura Electrónica de la Materia. II Congreso de la Facultad de Ciencias. UNAH. 2017.
- 2017: Esferas Matriciales y Caminatas Aleatorias Cuánticas. XI Congreso de Investigación Científica. UNAH. 2017.
- 2016: Almost GDF T -commuting Matrices and The Kirby Torus Trick. Seminario de Matemática Aplicada de UNM, UNM, EE. UU.
- 2016: Almost Z/m-Centralized Matrix Semialgebraic Varieties. Seminario de Geometría y Topología de UNM, UNM, EE. UU.
- 2016: Local Matrix Homotopies and Soft Tori. (GPOTS-UIUC 2016, Champaign, EE. UU.)
- 2016: Variedades Toroidales Matriciales Localmente Isomorfas Aproximadamente. Semana de la Carrera de Matemática, UNAH, C.U., 2016.
- 2016: Cálculo Numérico en Variedades Matriciales Toroidales. Semana de la Carrera de Matemática, UNAH, C.U., 2016.

- 2016: Botellas de Klein No-Conmutativas. I Congreso de la Facultad de Ciencias. UNAH, C.U., 2016.
- 2016: Botellas de Klein y Mapeos Cilíndricos No-Conmutativos. III ECAME, UPNFM. 2016.
- 2015: Randomized Matrix Computations and Group C*-Algebras. Seminario de Matemática Aplicada de UNM, UNM, EE. UU.
- 2015: Toroidal Dynamical Semigroups and The Kirby Torus Trick. Seminario de Geometría y Topología de UNM, UNM, EE. UU.
- 2014: Free Dynamical Semigroups in Noncommutative Semialgebraic Geometry. Seminario de Geometrá y Topología de UNM, UNM, EE. UU.
- 2014: Approximate Local Representations in Matricially Structured C*-Algebras. Seminario de Geometría y Topología de UNM, UNM, EE. UU.
- 2014: Free Dynamical Semigroups and Approximate Solvability of Matrix Equations. Seminario de Matemática Aplicada de UNM, UNM, EE. UU.
- 2011: Aproximación de Grupos Unitarios de Operadores por Métodos Proyectivos. V Congreso de Investigación Científica. DICU/UNAH.
- 2009. Factorización particular mimética del operador biarmónico en variedades de Hilbert Discretizables. Carrera de Matemática, UNAH. Septiembre, 2009.

Languages

Spanish	Native speaker
English	Professional/Advanced
German	Basic