

# CURRICULUM VITAE

## Luis Alberto Cisneros Ake

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### **Personal Information**

Place of birth: Uruapan, Michoacán, México.

### **Education**

- 2004-2007: PhD in Mathematical Sciences, National Autonomous University of Mexico (UNAM-Mexico).  
Advisor: Dr. Antonmaria Minzoni Alessio.  
Thesis: "Solitons in One and Two Dimensional lattices".
- 2002-2004: Master in Mathematical Sciences. National Autonomous University of Mexico (UNAM-Mexico)  
Advisor: Dr. Antonmaria Minzoni Alessio.  
Dissertation: "Asymptotics for Soliton Propagation in the Toda Lattice with Impurities".
- 1997-2001: Bachelor in Physics and Mathematics. National Polytechnic Institute (IPN-Mexico).  
Advisor: Dr. Germán González Santos.  
Thesis: "A Numerical Study of a Two-Dimensional Dry Foam".

### **Employment History**

- 01/2018- : Profesor Titular C, T.C. Department of Mathematics, National Polytechnic Institute (IPN-México), México City, México.
- 08/2018-07/2019: Fulbright Visiting Scholar at San Diego State University, USA.
- 09/2009-12/2017: Profesor Titular B, T. C. Department of Mathematics, National Polytechnic Institute (IPN-México), México City, México.
- 08/2007-07/2009: Postdoctoral Teaching. Department of Mathematics and Statistics, University of New Mexico. Albuquerque, New Mexico, USA.
- 08/2004-06/2007: Teaching Assistant. Facultad de Ciencias. National Autonomous University of Mexico (UNAM-México)

### **Fellowships, Honors and Awards**

- 2018-2019: Fulbright-García Robles program.
- 2012: Research Award at IPN 2012: Research developed by young researches.
- 2018- : National System of Researches level 2 (SNI-Conacyt-México).
- 2011-2017 : National System of Researches level 1.
- 2010- : Estimulo al Desempeño del Investigador (EDI-SIP-IPN), Level 7.
- 2010- : COFAA Level 4.
- 2004-2006: Research Assistant SNI-Exp763 working with Dr. Antonmaria Minzoni Alessio, National System of Researchers (Conacyt-México).
- 2004 : Master in Mathematical Sciences with Honors. UNAM-México
- 2002-2007: Scholarships from the Consejo Nacional de Ciencia y Tecnología, CONACYT-No.Reg.170517, and the National Autonomous University of México.
- 1999-2001: Diploma for the 10 Best Bachelor Students. National Polytechnic Institute.

1998-2001: Scholarship from the National Polytechnic Institute.

1998-2001: Scholarship as a research assistant working with Dr. Germán González Santos.

1996: Award “Padre de la Patria”. Best senior high school student. Universidad Michoacana de San Nicolás de Hidalgo, UMSNH.

### **Grants**

2017: Project “Solitones brillantes y oscuros en el límite de onda larga unidireccional para la transferencia de energía en cadenas anarmónicas” 20170867.

2016: Project “Estados auto localizados en la transferencia de energía en medios continuos deformables con potencial de sustrato” 20160873.

2012-2015: Ondas dispersivas no lineales y problemas en cadenas de osciladores, Clave 177246. Conacyt Ciencia básica. Investigador Principal: Panayiotis Panayotaros.

2015: Project “Estructuras coherentes en medios discretos no lineales y no locales” SIP-IPN 20150982.

2014: Project “Interacción entre modos dispersivos y no dispersivos en la evolución de una cadena cristalina unidimensional”. SIP-IPN 20140852.

2012-2013: Project “Wave propagation in nonlinear media”. SIP-IPN 20120651 and 20130803.

2010- 2011: Project “Asymptotics for nonlinear wave propagation in nonlinear oscillators”. SIP-IPN 20100464 and 20110199.

2007- 2010: Project “Nonlinear dispersive waves and problems in lattices”, SEP-Conacyt-Mexico 50303, with A. A. Minzoni and P. Panayotaros. Principal Investigator: P. Panayotaros.

### **Memberships**

Society for Industrial and Applied Mathematics.

### **Service and other activities**

2017- :Editor de la Miscelánea Matemática de la Sociedad Matemática Mexicana.

2015-2017: Presidente de la Academia de Matemáticas Aplicadas, ESFM-IPN.

2016: Sinodal de examen doctoral “oscilaciones localizadas en cadenas no lineales y aplicaciones en biomoléculas” Francisco Javier Martínez Farías, UNAM.

### **Research Interests: Nonlinear wave phenomena**

Asymptotic analysis. Nonlinear waves in discrete and continuous systems. Numerical solution of ordinary and partial differential equations. Soliton theory. Nonlinear optics. Applications to biology.

### **Publications**

#### **Research Papers**

1. L. A. Cisneros and A. A. Minzoni. Asymptotics for kink propagation in the discrete Sine-Gordon equation. *Physica D* 237, 50 (2008).
2. L. A. Cisneros and A. A. Minzoni. Asymptotics for supersonic soliton propagation in the Toda lattice equation. *Studies in Applied Mathematics*, 120:333 (2008).
3. L. A. Cisneros, A. A. Minzoni, P. Panayotaros and N. F. Smyth. Modulational Analysis of Large Scale Discrete Vortices. *Phys. Rev. E* 78, 036604 (2008).
4. L. A. Cisneros, J. Ize and A. A. Minzoni, Modulational and numerical solutions for the steady discrete Sine-Gordon equation in two space dimensions. *Physica D* 238, 1229 (2009).
5. Gaetano Assanto, Luis A. Cisneros, Antonmaria A. Minzoni, Benjamin D. Skuse, Noel F. Smyth and Annette L. Worthy. Soliton steering by the longitudinal modulation of the nonlinearity in waveguide arrays. *Physical Review Letters* 104, 053903 (2010).
6. A. B. Aceves, Luis A. Cisneros-Ake and A. A. Minzoni. Asymptotics for supersonic traveling waves in the Morse lattice. *Discrete and Continuous Dynamical Systems - Series S*. Vol. 4 No. 5, 975-994 (2011).

7. Luis A. Cisneros-Ake and A. A. Minzoni. Effect of hydrogen bond anharmonicity on supersonic discrete Davydov soliton propagation. *Phys. Rev. E* 85, 021925 (2012).
8. Luis A. Cisneros-Ake. Variational approximation for wave propagation in continuum and discrete media. *Rev. Mex. de Fis E* 59, 56 (2013).
9. Roberto I. Ben, Luis Cisneros Ake, A. A. Minzoni, Panayotis Panayotaros. Localized solutions for a nonlocal discrete NLS equation. *Phys. Letts. A* 379, 1705 (2015).
10. Luis A. Cisneros-Ake, Leonor Cruzeiro and Manuel G. Velarde. Mobile localized solutions for an electron in lattices with dispersive and non-dispersive phonons. *Physica D* 306, 82 (2015).
11. Luis A. Cisneros-Ake. Self-localized states for electron transfer in nonlocal continuum deformable media. *Phys. Lett. A* 380, 2828 (2016).
12. Luis A. Cisneros-Ake, José F. Solano Peláez. Bright and dark solitons in the unidirectional long wave limit for the energy transfer on anharmonic crystal lattices. *Physica D* 346, 20 (2017).
13. Luis A. Cisneros-Ake, Hugo Parra Prado, Diego Joselito López Villatoro, Ricardo Carretero-González. Multi-hump bright solitons in a Schrodinger-mKdV system. *Phys. Lett. A* 382, 837 (2018).
14. Luis A. Cisneros-Ake and L. Brizhik. Charge and energy transport by Holstein solitons in anharmonic one-dimensional systems. *Chaos, Solitons and Fractals* 119, 343 (2019).
15. L.A. Cisneros-Ake, R. Carretero-González, P.G. Kevrekidis, B.A. Malomed. Dynamics and stabilization of bright soliton stripes in the hyperbolic-dispersion nonlinear Schrodinger equation. *Commun Nonlinear Sci Numer Simulat* 74, 268 (2019).
16. Hugo Parra Prado, Luis A. Cisneros-Ake. Multi-hump bright and dark solitons for the Schrodinger-Korteweg-de Vries coupled system. *Chaos* 29, 053133 (2019).

### **Books**

17. **Chapter Book:** *Effects of radiation on sine-Gordon coherent structures in the continuous and discrete cases*. Co-authored with A. A. Minzoni. The sine-Gordon model and its applications: From pendula and Josephson junctions to gravity and high-energy physics. Springer, nonlinear systems and complexity. Editors: J. Cuevas, P. Kevrekidis and F. Williams, 2014.
18. **Chapter Book:** *Variational Approximation to electron trapping by soliton-like localized excitations in one-dimensional anharmonic lattices*. Co-authored with A. A. Minzoni and M. G. Velarde. Localized Excitations in Nonlinear Complex Systems, Nonlinear Systems and Complexity 7. Springer, nonlinear systems and complexity. Editors: Ricardo Carretero-González, Jesús Cuevas-Maraver, Dimitris Frantzeskakis, Nikos Karachalios, Panayotis Kevrekidis and Faustino Palmero-Acebedo, 2014.
19. **Chapter Book:** *A numerical study of weak lateral dispersion in discrete and continuous models*. Co-authored with A. A. Minzoni. Quodons in Mica: Nonlinear traveling excitations in crystals. Springer series in material sciences. Editors: Juan F. R. Archilla, Noé Jiménez, Victor J. Sánchez-Morcillo and Luis M. García-Raffi, 2015.

### **Divulgation**

20. Luis A. Cisneros-Ake. Soluciones aproximadas y la teoría de perturbaciones. *Carta Informativa* 75, 1 (2016).
21. Luis A. Cisneros-Ake, Hugo Parra Prado, José F. Solana Peláez. Efectos no lineales o ¿el estudio de los no elefantes? *Miscelánea Matemática* 64, 1 (2017).
22. Luis A. Cisneros-Ake. La teoría de modulaciones In *Memoriam: Antonmaria Minzoni Alessio*. *Miscelánea Matemática* 65, 69 (2018).

### **Submitted**

### **Accepted**

**Citations:** <http://scholar.google.com/citations?user=dbYYIWIAAAAJ&hl=es>

### **Advisor: MS Students**

- José Francisco Solano Peláez: Thesis “Propagación de pulsos coherentes en arreglos binarios de guías de onda”. Graduated June 2013.
- Aldo Iván Leal García: Thesis “Fenómenos oscilatorios en sistemas biológicos”. Graduated September 15, 2016.
- Lucila Roque Hernández: Thesis “Órbitas periódicas en sistemas planares polinomiales”. Graduated March 15, 2017.
- Hugo Parra Prado: Thesis “Integrabilidad y no integrabilidad en sistemas finitos periódicos de osciladores”. Graduated June 2, 2017.
- Ricardo López de Jesús: Thesis “Par de Lax en sistemas discretos integrables”. Graduated June 14, 2017.

### **Advisor: Undergraduate Students**

- Jaime Iván Urbina Rugerio: Thesis “Métodos variacionales en la ecuación no lineal de Schrödinger discreta”. Graduated June 19, 2012. ESFM-IPN.
- Jesús Antonio Jiménez López: Thesis “Aproximaciones numéricas y asintóticas en el péndulo invertido”. Graduated August 30, 2012. ESFM-IPN.
- Rodrigo Pineda Mondragón: Thesis “Osciladores no lineales con ruido blanco”. Graduated September 14, 2012. ESFM-IPN.
- Pedro Isaac Chávez López: Thesis “Aproximaciones numéricas y variacionales para la propagación de ondas en medios no lineales continuos”. Graduated October 29, 2012. ESFM-IPN.
- Mariela Nolasco Toledo: Thesis “Crecimiento de patrones en la glucólisis”. Graduated May 2, 2013. ESFM-IPN.
- Luis Roberto Sainz Ríos: Thesis “Modelo FitzHugh-Nagumo para el estímulos deterministas y estocásticos en neuronas”. Graduated April 25, 2014. ESFM-IPN.
- Hugo Parra Prado: Thesis “Oscilaciones no lineales en cadenas finitas de osciladores”. Graduated August 28, 2015. ESFM-IPN.
- Ana Lilia López Castro: Thesis “Estudio de las ecuaciones en recurrencia”. Graduated May 27, 2016. ESFM-IPN.
- Antonio Vázquez Ramos: Thesis “Transferencia coherente de energía en pozos variables movibles”. Graduated September 22, 2016. ESFM-IPN.
- Carlos Adrián Garnier Vilchis: Tesis Memoria “El enfoque de las TIC en matemáticas a nivel bachillerato”. Graduated December 6, 2016. ESFM-IPN.
- Juan Carlos González Rodríguez: Thesis “Cómputo en paralelo con GPUs en el estudio de sistemas reacción difusión”. Graduated March 20, 2018.

### **Supervisor: Social Service**

- Juan Carlos González Rodríguez. Ecuaciones reacción difusión (June 2017).
- Thalia Juárez Jiménez. Ecuaciones discretas (February 2015).
- Carlos Adrián Abitia Vargas. Cadenas anarmónicas (September 2014).
- Hugo Parra Prado. Problema FPU. (September 2014).
- Luis Roberto Sainz Ríos: Propagación de ondas no lineales en modelos de proteínas (October 2012).
- Mariela Nolasco Toledo: Modelos de patrones de crecimiento (June 2012).
- Jesús Antonio Jiménez López: Asintótica en ecuaciones diferenciales no lineales (August 2011).
- Pedro Isaac Chávez López: Propagación de ondas no lineales en aguas poco profundas (September 2011).

## Conference Talks and Poster Sessions

### **2018**

- March, Talk “Soluciones aproximadas y la teoría de perturbaciones” Seminario ConCiencia, UPIIH-IPN, Hidalgo.

### **2017**

- April, Talk “Efecto anarmónico en el solitón de Davydov en medios continuo y discreto” Seminario de matemáticas, ITAM.

### **2016**

- October, Talk “Transferencia coherente en medios deformables no locales” XLIX Congreso Nacional de la SMM, sección de Ecuaciones Diferenciales.
- October, Talk “Efectos no lineales o ¿El estudio de los no elefantes?: Dinámica de oscilaciones” XLIX Congreso Nacional de la SMM, sección de Miscelánea Matemática.
- November, Talk “Variety of solutions in anharmonic Davydov’s type equations” Dynamics Days Latin America and the Caribbean, BUAP, Puebla.

### **2015**

- February, Talk “Dispersión lateral débil en medios no lineales”. Seminario de Ecuaciones Diferenciales y Geometría. UAM-I.
- September, Talk “El solitón de Davidov para interacciones mecánicas de sitio”. Coloquio de Matemáticas Aplicadas. IIMAS-UNAM.
- October, Talk “Davydov’s type solitons for on-site mechanical interactions”. Analysis, Dynamics and Applications Seminar. Department of Mathematics. University of Arizona.
- October, Talk “El solitón de Davydov para interacciones armónicas de sitio” XLVIII Congreso Nacional de la SMM.

### **2014**

- January, Talk “Sobre la interacción entre fonones dispersivos y no dispersivos en un modelo unidimensional de una cadena cristalina”. Decima Conferencia en Análisis y Física Matemática, CIMA, UAEH.
- August, Talk “Mobile localized solutions for an electron in lattices with dispersive and non-dispersive phonons”, SIAM conference on NWCS, Cambridge UK.
- August, Talk “A numerical study of weak lateral dispersion in discrete and continuous models”. Research Meeting, Universidad Complutense de Madrid. España.
- October, Talk “Efectos no lineales o ¿El estudio de los no elefantes?” Tercer Conferencia de Divulgación de la LIMA. CIMA, UAEH.
- October, Talk “Dispersión lateral débil en medios no lineales”. XLVII Congreso Nacional de la SMM. Dgo Durango, México.

### **2013**

- January, Talk “Variational approximation to electron trapping by soliton-like localized excitations in one-dimensional anharmonic lattices”. Novena Conferencia en Análisis y Física Matemática, CIMA, UAEH.
- September, Talk “Continuum approach for the interplay between dispersive and non-dispersive modes in the polaron problem”. Research Meeting, Universidad Complutense de Madrid. España.
- September, Talk “Traveling coherent structures in the electron transport in 2D lattices”. Quodons in Mica, meeting in honor of Mike Russell. Altea, España.
- October, Talk “Aproximación variacional para la formación del polarón dinámico en la interacción entre modos dispersivos y no dispersivos en medios continuos”. XLVI congreso Nacional de la SMM. Mérida Yucatán, México.
- November, Talk “Aproximación continua en la interacción entre modos dispersivos y no dispersivos para la formación del polarón dinámico”. XIX Jornadas de Análisis. UAM-A, México.

### **2012**

- December, Talk “Solectron propagation in 2D”. Research Meeting, Universidad Complutense de Madrid. España.
- November, Talk “Aproximación por óptica geométrica para la transferencia y captura de exceso de electrones”. XLV congreso Nacional de la SMM. Querétaro, México.
- June, Talk “Wave Propagation in Anharmonic Discrete Systems”. SIAM Conference on nonlinear waves and coherent structures. The University of Washington, USA.
- June, Talk "Geometrical optics approximation for electron capture and electron transfer". Electron transfer meeting, Universidad Complutense de Madrid. España.
- April, Talk “Wave propagation in aharmonic (1D) and harmonic (1D, 2D) lattices”. Nonlinear Lattice Dynamics and Solectron Electric Conduction, Universidad Complutense de Madrid. España.
- April, Talk “Aharmonic Protein Chain Deformation”. Nonlinear Lattice Dynamics and Solectron Electric Conduction, Universidad Complutense de Madrid. España.

#### 2011

- January, Talk “Asymptotics for supersonic traveling waves in the Morse lattice”. VII Symposium Análisis y Física Matemática. Universidad Autónoma del Estado de Hidalgo, México.
- February, Talk “Propagación no lineal en modelos discretos de proteínas”. Seminario de Investigación en Matemáticas Aplicadas. Universidad Autónoma del Estado de Hidalgo, México.
- March, Talk “Nonlinear wave propagation in discrete protein models”. Seminar, department of mathematics. Southern Methodist University. Dallas, Texas USA.
- October, Talk “Aproximaciones asintóticas en fenómenos no lineales en cadenas”. Coloquio Tlahuilcalli. Área del análisis matemático y sus aplicaciones. Departamento de Ciencias básicas. División de ciencias básicas e ingeniería. UAM-A.
- October, Talk “Propagación de ondas en medios ópticos discretos”. Seminario de matemáticas aplicadas y computación. Programa estratégico de matemáticas aplicadas y computación. Instituto Mexicano del Petróleo.
- October, Talk “Propagación de pulsos en reflectores ópticos no lineales discretos”. XLIV Congreso Nacional de la Sociedad Matemática Mexicana. Universidad Autónoma de San Luis Potosí, SLP.

#### 2010

- May, Talk “Fenómenos no lineales en cadenas de osciladores”. Seminario de Geometría y Dinámica. Instituto de Física y Matemáticas, UMSNH, Michoacán, México.
- November, Talk “Propagación supersónica en una cadena discreta tipo Davydov”. XLIII Congreso Nacional de la Sociedad Matemática Mexicana, Tuxtla Gutiérrez Chiapas, México

#### 2009

- October, Talk “Supersonic traveling wave solutions in nonlinear discrete equations”. VIII Americas Conference on Differential Equations, PASI 2009. México City and Veracruz, México.
- May, Talk “Ondas no lineales en ecuaciones diferenciales discretas”. Coloquio del departamento de matemáticas. Universidad Autónoma de Zacatecas. Zac., Zacatecas. México.

#### 2008

- October, Talk "Supersonic traveling wave solutions in nonlinear discrete equations". Graduate Colloquium. University of New Mexico, Albuquerque New Mexico USA.
- September, Talk "Nonlinear waves in discrete lattices" Future Faculty Career Exploration Program. Rochester Institute of Technology. Rochester New York USA.
- June, Talk "Soluciones asintóticas estacionarias en la ecuación de Sine-Gordon discreta en dos dimensiones espaciales" CIMA Colloquium. Centro de Investigación en Matemáticas. Universidad Autónoma de Pachuca, Pachuca México.

#### 2007

- September, Talk "Solitons in One and Two Dimensional lattices". Graduate Colloquium. University of New Mexico, Albuquerque New Mexico USA.

- May, Talk “Lump-Type Solutions for the Two-Dimensional Discrete Sine-Gordon Equation”. VII Joint Meeting SMM-AMS, Universidad Autónoma de Zacatecas, Zac., Zacatecas México.

**2006**

- November, Poster "An Asymptotic Study of the One-Dimensional Discrete Sine-Gordon Equation". Workshop: Properties of New Optical Materials and their Applications. Tucson, Arizona USA.
- September, Talk "A Numerical Study on the Two-Dimensional Discrete Sine-Gordon Equation". First Joint CMS/SMM Meeting, Guanajuato, Gto., México.
- September, Poster "An Asymptotic Study of the One-Dimensional Discrete Sine-Gordon Equation". SIAM conference on Nonlinear Waves and Coherent Structures. Seattle, Washington USA.

**2005**

- January, Talk "Asymptotics for Soliton Propagation in the Toda Lattice with Impurities". Pan-American Advanced Studies Institute Americas VI, Santiago de Chile.

**2003**

- June, Summer School "Nonlinear Phenomena in Computational Chemical Physics". University of Barcelona, Barcelona, España.

**2000**

- May, Poster in the "V Reunión Nacional Académica de Física y Matemáticas (ESFM-IPN)", México D. F.

**1999**

- October, Poster in the XXXII National Congress of the Mexican Mathematical Society, Guadalajara México.

**Teaching Experience**

**Professor:** Department of Mathematics, National Polytechnic Institute (IPN-México).

Spring 2018: Numerical Methods and Ordinary Differential Equations (Graduate class).

Fall 2017: Calculus I and Numerical Methods.

Spring 2017: Calculus IV and Partial Differential Equations.

Fall 2016: Calculus III and Numerical Methods.

Spring 2016: Partial Differential Equations II and Numerical Solution of PDEs (Graduate class).

Fall 2015: Partial Differential Equations I and Partial Differential Equations (Graduate class).

Spring 2015: Differential Equations, Theory of Differential Equations I, Selected Topics of Ordinary Differential Equations (Graduate class) and Ordinary Differential Equations (Graduate class).

Fall 2014: Calculus I and ODE (Graduate class).

Spring 2014: Theory of Differential Equations I and ODE (Graduate class).

Fall 2013: Partial Differential Equations and Selected Topics on ODEs (Graduate class).

Spring 2013: Partial Differential Equations II and Selected Topics on Numerical Analysis (Graduate class).

*Fall 2012:* Partial Differential Equations I and Calculus III.

*Spring 2012:* Partial Differential Equations I, Calculus II and Partial Differential Equations (Graduate class).

*Fall 2011:* Partial Differential Equations II, Calculus I and Selected Topics on ordinary differential equations (Graduate class).

*Spring 2011:* Partial Differential Equations II and Ordinary Differential Equations (Graduate class).

*Fall 2010:* Partial Differential Equations I and Ordinary Differential Equations (Graduate class).

*Spring 2010:* Numerical Methods and Calculus IV.

*Fall 2009:* Numerical Methods, Partial Differential Equations I and Partial Differential Equations II.

**Fulbright Visiting Scholar:** at San Diego State University, USA.

Spring 2019: Math 245: Discrete Mathematics

Fall 2018: Math 245: Discrete Mathematics

**Postdoctoral Teaching:** Department of Mathematics and Statistics, University of New Mexico, USA.

*Summer 2009:* Differential Calculus and Ordinary Differential Equations with Applications.

*Spring 2009:* College Algebra, Differential Calculus and Calculus in Several Variables.

*Fall 2008:* Differential Calculus and Two Ordinary Differential Equations with Applications courses.

*Summer 2008:* Linear Algebra with Applications.

*Spring 2008:* Two Differential Calculus courses and Ordinary Differential Equations with Applications.

*Fall 2007:* Differential Calculus and Ordinary Differential Equations with Applications.

**Teaching Assistant:** Faculty of Sciences. National Autonomous University of México (UNAM-México).

*February-June 2007:* Calculus in Several Variables.

*August-January 2007:* Calculus in Several Variables and Partial Differential Equations.

*February-June 2006:* Calculus in one Variable and Complex Variables.

*August-January 2006:* Calculus in one Variable.

*February-June 2005:* Complex Variables.

*August-January 2005:* Partial Differential Equations.