Curriculum Vitae

Vu Hoang

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Research and professional experience

09/2018 – Present	**Assistant Professor**, University of Texas at San Antonio
09/2017 – 08/2018	**Visiting Assistant Professor**, University of Texas at San Antonio
01/2015 – 08/2017	**Instructor of Mathematics**, Rice University. Partially Funded by the German Research Foundation, DFG-Grant FOR HO 5156/1-2.
11/2014 – 12/2014	**Visiting postdoc**, Rice University, Prof. Alexander Kiselev, Funded by the German Research Foundation, DFG-Grant FOR HO 5156/1-2.
10/2013 – 10/2014	**Honorary Fellow**, University of Wisconsin-Madison, Prof. Alexander Kiselev, Funded by the German Research Foundation, DFG-Grant FOR HO 5156/1-1.
10/2010 – 09/2013	**Postdoc**, Institute for Analysis and Graduiertenkolleg 1294 ("Analysis, Design und Simulation of Nanotechnological Processes"), Prof. D. Hundertmark and Prof. M. Plum, Karlsruhe Institute of Technology (KIT).
11/2005 – 09/2010	**Scientific Assistant** at the Institute for Analysis (KIT), Prof. M. Plum.

Education

11/2005 – 6/2010	**Ph.D.** (Dr. rer. nat., summa cum laude) in Mathematics, Karlsruhe Institute of Technology, Germany. **Thesis:** *"Solution enclosures for scalar conservation laws"* **Advisors:** Michael Plum, Wolfgang Reichel
10/2000 – 10/2005	Study of Physics, University of Karlsruhe (now Karlsruhe Institute of Technology) Karlsruhe, Germany. Graduated with **Diploma**. **Thesis:** *"Charakterisierung der spektralen Bänder bei periodischen Schrödingeroperatoren"* **Advisors:** Peter Wölfle, Michael Plum.

Grants and Awards

09/2019 – 10/2020	UTSA Grants for Research Advancement and Transformation (GREAT) ($20,000)
06/2016 – Present	NSF grants DMS-1614797 and DMS-1810687 ($190,394)
10/2014 – 9/2015	Research Fellowship, German Research Foundation (DFG) FOR HO 5156/1-2 ($48,786).
10/2013 – 9/2014	Research Fellowship, German Research Foundation (DFG) FOR HO 5156/1-1 ($49,650).
1/2001 – 10/2005	Fellow of the "Studienstiftung des Deutschen Volkes" (German Academic Scholarship Foundation), an organization supporting the top 0.5% students in Germany.

Professional Memberships

10/2020 – Present	Full member of Sigma Xi Scientific Research Honor Society

Research interests

Partial differential equations, analysis, spectral theory, mathematical physics, spectral theory of periodic problems, electrodynamics, theory of hyperbolic conservation laws and relativistic viscous fluids.

In preparation/preprint stage

- [24] with A. DeLeon, A. Baza, A. Harb: Nonlinear Dispersion Relations for Israel-Stewart fluids. *In preparation.*

Publications

- [23] with M. Radosz, A. Harb, A. DeLeon and A. Baza: Radiation Reaction in Higher-order Electrodynamics. Journal of Mathematical Physics 62, 072901 (2021); `https://doi.org/10.1063/5.0042690`
- [22] with F. S. Bemfica, M. M. Disconzi, J. Noronha and M. Radosz. Nonlinear Constraints on Relativistic Fluids Far From Equilibrium, Phys. Rev. Lett. 126, Issue 22, 222301, `https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.126.222301`.
- [21] with M. M. Disconzi and M. Radosz. Breakdown of smooth solutions to the Müller-Israel-Stewart equations of relativistic viscous fluids. *Submitted.* `https://arxiv.org/abs/2008.03841`.
- [20] with B.M. Brown, M. Plum, M. Radosz and I. Wood: Gap localization of multiple TE-Modes by arbitrarily weak defects. *J. London Math. Soc. 102 (2) (2020), pages 773 – 795*, `https://doi.org/10.1112/jlms.12337`,
- [19] with D. Hundertmark, J. Richter and S. Vugalter: Quantitative bounds versus existence of weakly coupled bound states for Schrödinger type operators. *To appear in Annales Henri Poincaré.* Preprint `https://arxiv.org/abs/1610.09891`, 42 pages.
- [18] with M. Radosz: A Note on Singularity Formation for a Nonlocal Transport Equation. *In: Advances in the Mathematical Sciences: AWM Research Symposium, Houston, TX, April 2019 (2020). Bahar Acu, Donatella Danielli, Marta Lewicka, Arati Nanda Pati, Saraswathy RV, Miranda I. Teboh-Ewungkem (Eds.)*, `https://doi.org/10.1007/978-3-030-42687-3_15`
- [17] with S. A. Nugroho and A. F. Taha: Nonlinear Dynamic Systems Parameterization Using Interval-Based Global Optimization: Computing Lipschitz Constants and Beyond. `https://arxiv.org/abs/2004.12061`, *To appear in IEEE Transactions on Automatic Control (2021).*
- [16] with S. A. Nugroho, M. Radosz, S. Wang and A. F. Taha, New Insights on One-Sided Lipschitz and Quadratically-Inner Bounded Nonlinear Dynamic Systems, *2020 American Control Conference (ACC), Denver, CO, USA, 2020, pp. 4558-4563*, `https://doi.org/10.23919/ACC45564.2020.9147812`.
- [15] with A. DeLeon, A. Baza, A. Harb, and M. Radosz: On Self-force for Particles Coupled to Higher-order Electrodynamics and Scalar Fields. (Session AT2, "The Einstein-Infeld-Hoffmann Legacy in Mathematical Relativity" (Organizers A. Shadi Tahvildar-Zadeh, Michael Kiessling). *To appear in Proceedings of the 15th Marcel Grossmann meeting.*
- [14] with M. Radosz: Singular Solutions for Nonlocal Systems of Evolution Equations with Vorticity Stretching. *SIAM J. Math. Anal., 52(2), 2158–2178 (2020), 21 pages*, `https://doi.org/10.1137/19M1265570`.

- [13] with B. Orcan-Ekmekci, M. Radosz, H. Yang: *Blowup with vorticity control for a 2D model of the Boussinesq equations. Journal of Differential Equations*, Vol. 264 (12), p.7328-7356 (2018). https://doi.org/10.1016/j.jde.2018.02.021
- [12] with B.M. Brown, M. Plum, M. Radosz and I. Wood: *Gap localization of TE-Modes by arbitrarily weak defects.* J. London Math. Soc. 95 (3) (2017), 942–962, https://doi.org/10.1112/jlms.12046.
- [11] with M. Radosz: *Cusp formation for a nonlocal evolution equation*, Arch. Rational. Mech Anal, 224(3) pp 1021-1036 (2017), https://doi.org/10.1007/s00205-017-1094-3
- [10] with M. Radosz: *No local double exponential gradient growth for the 2D Euler equation.* Transactions of the American Mathematical Society, Volume 369, Number 10, February 2017, Pages 7169–7211, (http://dx.doi.org/10.1090/tran/6900)
- [9] with T. Do, M. Radosz and X. Xu: *One-dimensional model equations for hyperbolic fluid flow.* Nonlinear Analysis: Theory, Methods & Applications Volume **140**, July 2016, Pages 1–11, https://doi.org/10.1016/j.na.2016.03.002.
- [8] with M. Brown, M. Plum and I. Wood: *On the spectrum of waveguides in planar photonic bandgap structures.* Proceedings of the Royal Society A, 2176 (vol 471), (2015). https://doi.org/10.1098/rspa.2014.0673.
- [7] with M. Brown, M. Plum and I. Wood: *Spectrum created by line defects in periodic structures.* Mathematische Nachrichten, Vol. **287**, Issue 17–18, pages 1972–1985, https://doi.org/10.1002/mana.201300165, (2014).
- [6] with M. Radosz: *Absence of bound states for waveguides in 2D periodic structures.* Journal of Mathematical Physics **55**, 033506, https://doi.org/10.1063/1.4868480, (2014).
- [5] with M. Brown, M. Plum, I. Wood: *Floquet-Bloch theory for elliptic problems with discontinuous coefficients.* Spectral theory and analysis, Oper. Theory Adv. Appl. 214, Birkhäuser, Basel, 1–20, https://doi.org/10.1007/978-3-7643-9994-8_1, (2011).
- [4] *The Limiting Absorption Principle in a semi-infinite periodic waveguide.* SIAM Journal on Applied Mathematics, Vol.**71**, No.3, pages 791–810, https://doi.org/10.1137/100791798, (2011).
- [3] with M. Plum, Ch. Wieners: *A computer-assisted proof for photonic band gaps.* Zeitschrift für angewandte Mathematik und Physik, 60, Issue 6 (2009), https://doi.org/10.1007/s00033-008-8021-2.
- [2] with H. Behnke, M. Brown, M. Plum: *Computer-Assisted Band-Gap Proof for 3D Photonic Crystals*, AIP Conference Proceedings 1168, 930 (2009); https://doi.org/10.1063/1.3241635
- [1] with M. Brown, M. Wood and I.Wood, *On spectral bounds for photonic crystal waveguides*, Inequalities and applications, 22-30, Inter. Ser. Numer. Math., 157, Birkhäuser, Basel (2008), https://doi.org/10.1007/978-3-7643-8773-0_3.
- [0] *Solution Enclosures for Scalar Conservation Laws*, Karlsruher Inst. für Technologie, KIT-Bibliothek, 2010, https://doi.org/10.5445/IR/1000022444

Conference/Workshop organization

- Oberwolfach Mini-Workshop *Relativistic Fluids at the Intersection of Mathematics and Physics.* Organized by V. Hoang, S. Beheshti (QMU London) and M. Disconzi (Vanderbilt University). December 13-19, 2020.

Invited Talks and Conferences

2022 Texas A&M Corpus Christi Applied Math Seminar , February 18.

2021 Rutgers Mathematical Physics Group Working Seminar, Prof. A.S. Tahvildar-Zadeh and Prof. M. Kiessling, September 2.
16th Marcel Grossmann meeting (Rome, held online), July 5-9.

2020 AMS Central Fall Virtual Sectional Meeting (formerly at University of Texas at El Paso). September 12-13. Minisession "Special Session on Theoretical and Computational Studies of PDEs Related to Fluid Mechanics".
Theoretical Physics Group Seminar UTSA. July 29, 2020. "Introduction to Quantum Gravity."
Theoretical Physics Group Seminar UTSA. February 10 and February 17, 2020. "Introduction to relativistic fluids."

2019 Louisiana-Texas SIAM Sectional Meeting, November 1-3. Minisession "Dispersive Equations and Nonlinear Waves".
PDE Seminar, Vanderbilt University (Nashville), September 27.
Mathematical Association of America at UTSA, February 8, "The geometry of space-time".

2018 Louisiana-Texas SIAM Sectional Meeting, October 6-7. Minisymposium "Spectral theory of differential operators".
15th Marcel Grossmann Meeting (Rome), July 1-7.
Karlsruhe Analysis Seminar (Karlsruhe, Germany), June 26.
AMS Sectional Meeting (Boston), April 21-22.
Texas Differential Equations Conference (Texas DE, San Antonio), March 24-25.

2017 TexAMP 2017, Austin (Texas), November 3–5, 2017
AMS Sectional Meeting, Denton (Texas), September 9–10, 2017
Darmstadt Analysis Days, University of Darmstadt (Germany), Prof. M. Hieber, May 16, 2017
Analysis Seminar, University of Bonn (Germany), Prof. B. Niethammer, May 12, 2017
Institute Seminar, University of Stuttgart (Germany), Prof. G. Schneider, May 8, 2017
AMS Meeting in Pullman, Washington State, Special Session "Analysis on the Navier-Stokes equations and related PDEs", April 22–23, 2017
UTSA, Prof. C. Gui, February 2, 2017.
University of Oklahoma, January 29, 2017
Louisiana State University, January 23, 2017.

2016 Analysis of Fluids and Related Topic Seminar, Princeton University, November 17, 2016.
Mathematical Physics seminar, Prof. T. Chen, UT Austin, September 9, 2016.
PDE seminar, Prof. Y. Yao, Georgia Tech, August 30, 2016.
Oberseminar Analysis, Prof. L. Székelyhidi, University of Leipzig, Leipzig (Germany), July 5, 2016.
Seminar Analysis, Prof. T. Bartsch, University of Giessen, Giessen (Germany), June 30, 2016.
Analysis of PDEs of Fluid Mechanics, Rice University, Houston, May 9–12, 2016.
MPHADE Seninar, Prof. P. Kuchment, Texas A&M, College Station, April 29th, 2016.

2015 TexAMP 2015, Dallas, November 6–8, 2015.
Analysis Seminar, Prof. T. Chen, UT Austin, Austin.
PDE Seminar, Prof. D. Wagner, University of Houston, Houston.

Nonlinear PDE days, Karlsruhe, June, 14–15, 2015.
Analysis seminar, Prof. E. Titi, Texas A&M, College Station.
Spectral Theory and and Weyl Functions, Oberwolfach, January, 4–10, 2015
Karlsruhe Institute of Technology, January 15, 2015.

2014 TexAMP 2014, Austin, Texas, November 21–23, 2014

2013 Short research stay, UW-Madison, Prof. Alexander Kiselev, March 27 – April 11, 2013
Summer School at Stanford, August 5 – 18, 2013

2012 Newton Institute, Cambridge, UK, 1–15 August 2012

2011 Newton Institute, Cambridge, UK, 1–30 November 2011
DMV Jahrestagung 2011, Universität zu Köln, 19–22 September
WAVES 2011, Vancouver, 25–19 July
ESPRC Gregynog Workshop (Workshop on Analytic and Computational Techniques in Spectral Theory and Related Topics), Gregynog (UK), 18–24 June

2010 Metamaterials 2010, Karlsruhe, 13–16 September

2009 Dagstuhl Seminar "Computer-assisted proofs - tools, methods and applications", Saarbrücken, 15–20 November
INDAM 2009, Bertinoro (Italy), 13–18 September

2008 Gregynog Spectral Theory Workshop 2008, Gregynog (UK), July

2007 NOLTA 2007, Vancouver, 16–19 September
General Inequalities, Noszvaj (Hungary), 10–15 September

2006 NOLTA 2006, Bologna, 11–14 September

Undergraduate Outreach

2019 Mathematical Association of America Chapter at UTSA, San Antonio, 8 February. I gave a talk with title *Geometry of Space-time*.

Undergraduate Research Mentoring At UTSA, I'm mentoring/have mentored the following undergraduate students:

- Angel Harb (Mathematics major)
- Aaron DeLeon (Physics and Astronomy major)
- Vicente Lira (Mathematics major)
- Ramiro Ramirez (Mathematics major)
- David Rios (Mathematics major)

as well as the following graduate students:

- Alan Baza (Industrial and Applied Mathematics Program)
- Johnraymond Yanez (Industrial and Applied Mathematics Program)

- Irving Cedillo Ramirez (Industrial and Applied Mathematics Program)

In particular, I co-authored a publication ([22]) with A. Harb, A. DeLeon and A. Baza. I have mentored V. Lira and A. Harb on different undergraduate projects, leading to the peer-reviewed publications

- A. Harb: *Demystifying Special Relativity and the K-Factor.* The University of Texas at San Antonio Journal of Undergraduate Research and Scholarly Works (JURSW), **5** (2019), `https://hdl.handle.net/20.500.12588/77`.
- V. Lira: *Introduction to Differential Forms in Tensor Calculus.* The University of Texas at San Antonio Journal of Undergraduate Research and Scholarly Works (JURSW), **6** (2019), `https://hdl.handle.net/20.500.12588/91`.

I'm mentoring/have mentored the following high school students:

- Tony Li (Ronald Reagan High School)

Teaching experience in US

UTSA (Undergraduate)

- MAT 1214: Calculus I (Summer and Fall 2017)
- MAT 3613: Differential Equations I (Spring 2018)
- MAT 3623: Differential Equations II (Spring 2020 and Spring 2021)
- MAT 2214: Calculus III (Spring and Fall 2018)
- MAT 4213: Real Analysis I (Fall 2018)
- MAT 4223: Real Analysis II (Fall 2019)
- MAT 3013: Foundations of Mathematics (Fall 2019 and Fall 2020)
- MAT 3213: Foundations of Analysis (Spring 2020 and Spring 2021)

UTSA (Independent studies, Directed Research)

- MAT 5973 (Spring 2019, Student: Alan Baza)
- MAT 6953 (Summer 2019, Student: Johnraymond Yanez)
- MAT 4913 (Fall 2019, Students: Angel D. Harb and Ramiro A. Rodriguez)
- MAT 5973 (Fall 2019, Student: Alan Baza)
- MAT 6953 (Fall 2019, Student: Irving R. Cedillo Ramirez)
- MAT 4913 (Fall 2020, Student: David Rios)
- MAT 6953 (Fall 2020, Student: Michael Brinkman)

Rice University

- MATH 211: Ordinary Differential Equations and Linear Algebra (Spring 2015, Fall 2015, Spring 2016, Fall 2016).

- MATH 212: Multivariable Calculus (Fall 2015, Fall 2016).

Teaching experience in Germany

I have taught the following classes at the Karlsruhe Insitute of Technology (formerly University of Karlsruhe), most of them in English:

- Analysis 3, winter semester 2006/2007.
- Higher Mathematics for Computer Scientists (for first semester Computer Science Students. Here I supervised 7 teaching assistants), winter semester 2009/2010, summer semester 2010
- Partial Differential Equations, winter semester 2008/2009
- Boundary and Eigenvalue problems, summer semester 2006 and summer semester 2007
- Computer-assisted Proofs for Partial Differential Equations, winter semester 2005/2006 and summer semester 2008
- Nonlinear Boundary Value Problems, winter semester 2007/2008
- Mathematical methods of quantum mechanics, summer semester 2011
- Higher mathematics for electrical engineering, summer semester 2013

For graduate students I taught

- Partial Differential Equations with Periodic Coefficients, summer semester 2011

During my whole time at the KIT, I regularly wrote and graded exams and served as co-examiner during oral exams. I co-organized a number of student seminars:

- Applied analysis, summer 2013.
- Calculus of Variations, summer semester 2010.
- Boundary and eigenvalue problems (various times during the period 2006-2013)
- Problems in mathematical physics, summer 2013

Departmental service

11/2020 – Present	Member of Website Committee, Executive Committee, Scholarship Committee
08/2020 – Present	Course coordinator MAT 3013
10/2018 – 3/2020	Member Colloquium Committee
11/2019 – Present	PhD defense committee Sebastian A. Nugroho (Dept. of Electrical and Computer Engineering)

Peer review activity

- Communications in Computational Physics, Journal of Mathematical Physics, Communication in Mathematical Sciences, Journal of Mathematical Inequalities, Annals of PDE, SIAM Journal on Mathematical Analysis, Journal of Mathematical Analysis and Applications, Mathematische Annalen, SIAM Journal on Numerical Analysis.
- American Control Conference (ACC) 2021.

Students recommended

- Yuhang Jia, accepted to Boston University Questrom School of Business (January 2021).
- Alan Baza, accepted into UTSA's Mechanical Engineering PhD program (Fall 2020).
- Ngoc Nguyen (general industry internship, Feb 2021)
- Sebastian A. Nugroho (Postdoc)
- Esteban Jacob Ramirez (2021 La Serena School of Science), April 2021
- Aaron DeLeon, accepted into UTSA's Physics Department as a grad student, Fall 2021