RESEARCH PROFILE AND PUBLICATION LIST

TAO LUO

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Academic Awards:

- Best Paper Award of 2017 International Consortium of Chinese Mathematicians, December 2017.

Editorial Borad:

- Kinetic and Related Models.

Research Interests: Nonlinear Partial Differential Equations, Mathematical Theory of Fluid Dynamics, Fluids Free Boundary Problems, Hyperbolic Conservation Laws, Calculus of Variations.

Selected Talks and Presentations in Conferences

- International Conference on Differential Equations and Dynamic Systems, Changsha, China (online), April, 2021 (Invited speaker),
- The fifth international conference on nonlinear evolutionary partial differential equations-theories and applications, Shanghai, China (online), 12/2020 (Invited speaker)
- Workshop on nonlinear PDE theory and applications, Shanghai Jiaotong University, Dec 2019 (Invited Speaker)
- International Conference on Mixed-type Partial Differential Equations and Optimal Transport Theory (online), Capital Normal University, December 2021, (Invited speaker),
- Conference on Nonlinear Partial Differential Equations and Applications, July, 2019, University of Michigan, Ann Arbor (Invited Speaker).
- The 8th International Congress of Chinese Mathematicians (June, 2019), Beijing (Invited Speaker).
- 2017 International Consortium of Chinese Mathematicians, December 2017, Guangzhou (Invited Speaker).

- Plenary Lecture, The 14th International Conference on Free Boundary Problems (July, 2017).
- Plenary Lecture, Hong Kong Mathematical Society Annual Meeting (May 2016).
- Distinguished lecture, The Third West China Conference on PDEs, Yunan (August, 2015).
- The International Workshop on Multidimensional Conservation Laws and Related Problems (Shanghai Jiaotong University, June, 2017) (Invited Speaker)
- Himeji Conference on partial differential equations (Himeji, Japen, 2017) (Invited Speaker)
- Conference on Applied Analysis (Jinan University, Feb. 2017) (Invited Speaker)
- The 8th international congress of industrial and applied mathematics, Minisymposium on " conservation laws and related models", Beijing (August, 2015)
- The 4th international conference on nonlinear evolutionary partial differential equations, Shanghai, June 2015 (Invited speaker)
- The 8th international conference on nonlinear PDEs and their numerical analysis, Hangzhou, May, 2015 (Invited speaker)
- AMS-AWM Special Session on Nonlinear Hyperbolic Partial Differential Equations (Joint Annual Meeting, Boston), January, 2012 .
- New Perspectives in Nonlinear Partial Differential Equations, University of Michigan, Ann Arbor, USA, May, 2011 (Invited speaker).
- Recent Developments in Nonlinear Partial Differential Equations: Part II, Chinese University of Hong Kong, May, 2011 (Invited speaker).
- The Fifth International Congress of Chinese Mathematicians, Beijing, December, 2010 (Invited speaker)
- The 13th International Conference on Hyperbolic Problems", (Plenary Speaker), Beijing, June, 2010.
  (This is a major international conference in my research field)
- 7th International Conference on Hyperbolic Problems. ETH, Zurich, Feb. 1998 ((Invited speaker).
- IMA summer program on Nonlinear Conservation Laws and Application, Minnesota, July, 2009 (Invited speaker).
- Hyperbolic Systems of Conservation Laws and Related Problems, Birs, Canada, October, 2006(Invited speaker).
- FRG workshop of multidimensional hyperbolic conservation laws, University of Wisconsin, June, 2005 ((Invited speaker).
- FRG workshop of multidimensional conservation laws and kinetic theory, Stanford University, July 2004 (Invited speaker).
- AMS Sectional meeting, University of Pittsburgh, November 2004.
- Nonlinear Evolutionary Equations and Applications, Northwestern University, June 2003 (Invited speaker).
- AMS Sectional Meeting, Ann Arbor, Feb. 2002
- Differential Equations From Mechanics, Chinese University of Hong Kong, June 1999 (Invited speaker).

Selected Colloquium and Seminar Talks:

- PDE seminar (online), Chinese Academy of Sciences, Dec. 21 ,
- PDE seminar, Chinese University of Hong Kong, Oct , 2021
- IMS Colloquium, Chinese University of Hong Kong, Oct , 2020.
- Differential Equations Seminar, University of Michigan, Ann Arbor, April, 2019.
- Differential Equations Seminar, University of Michigan, Ann Arbor, September, 2017.
- Seminar, AMSS, Chinese Academy of Sciences, June 2017.
- Seminar, Wuhan University, June 2017.
- Seminar, Chongqing University, April, 2017.
- Seminar, AMSS, Chinese Academy of Sciences, March 2016.
- Colloquuim, Georgetown University, Feb. 2016.
- IMS Colloquuim, IMS, Chinese University of Hong Kong, January 2016.
- Seminar, AMSS, Chinese Academy of Sciences, May 2015.
- PDE seminar, IMS, Chinese University of Hong Kong, August 2014.
- Seminar, City University of Hong Kong, July, 2014.
- PDE seminar, Chinese Academy of Sciences, May 2014.
- PDE seminar, Beijing university of Technology, March 2014.
- PDE seminar, Beijing Institute of applied physics and computational mathematics, March 2014.
- PDE seminar, University of Pittsburgh, January, 2014,
- PDE seminar, City University of Hong Kong, December, 2013,
- PDE seminar, South China normal University, December 2013.
- PDE seminar, Chinese University of Hong Kong, January, 2013,
- PDE seminar, Wuhan University, China, June 2013.
- PDE seminar, IMS, Chinese University of Hong Kong (4 two hr lectures), Dec. 2009-Jan. 2010.
- PDE seminar, Chinese Academy of Sciences, June 2009.
- PDE seminar, University of Pittsburgh, USA, March, 2009.
- IMS lecture series, Chinese University of Hong Kong (8 two hr lectures) (June, 2008-August, 2008).
- Differential Equation seminar, University of Michigan, USA, March, 2008,
- Applied Math Seminar, Ohio State University, USA, Jan. 2008.
- Differential Geometry Seminar, Harvard University, USA, Nov. 2007.
- PDE Seminar, Brown University, USA, Oct. 2007
- PDE & Analysis Seminar, University of Massachusetts, Amherst, USA Oct. 2007.
- PDE and Image Analysis Seminar, University of Connecticut, USA, Sept, 2007.
- Colloquium, Worcester Polytechnic Institute,USA, Feb., 2007.
- Colloquium, University of South Florida, USA, Feb., 2007.
- PDE and Applied Math Seminar, University of Maryland, College Park, USA, Nov. 2006.
- Seminar, PDE Center of Academy of Mathematics and System Science, Beijing, China. August 2006.

- PDE seminar, City University of Hong Kong, June, 2006.
- Colloquium, University of Colorado, Boulder, USA Jan., 2006.
- Colloquium, Kansas State University, USA, Nov. 2005.
- PDE seminar, Capital Normal University, Beijing, China. June 2005.
- PDE seminar, Georgia Institute of Technology, USA, April 2005.
- PDE and Applied Math Seminar, University of Maryland, College Park, USA, Sept. 2003.
- Colloquium, Georgetown University, USA, Feb. 2003.
- Colloquium, University of Illinois, Urbana-Champion, USA, Jan. 2003.
- Colloquium, University of British Columbia, Canada, Jan. 2003.
- Differential Equation Seminar, University of Michigan, Ann Arbor. USA, Jan. 2003.
- Differential Equation Seminar, University of Michigan, Ann Arbor. USA, Sept. 2000.

Publications:

- On the Free Surface Motion of Highly Subsonic Heat-conducting Inviscid Flows (with Huihui Zeng), Arch. Ration. Mech. Anal. 240 (2021), no. 2, 877–926.
- Well-Posedness for the Linearized Free Boundary Problem of Incompressible Ideal Magnetohydrodynamics Equations, (with C. Hao), . J. Differential Equations 299 (2021), 542–601.
- Compressible viscous heat-conducting surface wave without surface tension (with Yongting Huang), J. Math. Phys. 62 (2021), no. 6, Paper No. 061501, 30 pp.
- Ill-posedness of free boundary problem of the incompressible ideal MHD, Commun. Math. Phys. 376 (2020), no. 1, 259–286. (with Chengchun Hao) (2019) .
- Singular Limits for the Navier-Stokes-Poisson Equations of Viscous Plasma with Strong Density Boundary Layer (with Q. Ju & X. Xu), submitted.
- Liu, Hairong; Luo, Tao; Zhong, Hua; Global solutions to compressible Navier-Stokes-Poisson and Euler-Poisson equations of plasma on exterior domains. J. Differential Equations 269 (2020), no. 11, 9936–10001 (with Liu, Hairong & Zhong, Hua).
- Some results on fluid free boundary problems. Proceedings of the International Consortium of Chinese Mathematicians 2017, 453–464, Int. Press, Boston, MA, [2020], with Huihui Zeng.
- Global solution of 3D irrotational flow for gas dynamics in thermal nonequilibrium, Ann. I. H. Poincaré-AN (2019) 37 (2020), no. 1, 225–238. (with Yongting Huang).
- Initial layer and incompressible limit for Euler-Poisson equation in nonthermal plasma. Math. Models Methods Appl. Sci. 29 (2019), no. 9, 1733–1751 (with S. Wang & Y. Wang).
- On an initial boundary value problem for gas dynamics in thermal nonequilibrium (joint with D. Chang & H. Zhong), J. Math. Phys. 60 (2019), no. 12, 121505, 30 pp.
- Nonlinear Asymptotic stability of traveling waves of system for gas dynamics in thermal nonequilibrium, J. Dynam. Differential Equations 32 (2020), no. 2, 941–963 (with Y. L. Wang).

- Uniform regularity and relaxation limit for the outer pressure problem of gas dynamics with several thermal nonequilibrium modes (with Y. L. Wang) , J. Differential Equations 268 (2020), no. 4, 1750–1770.
- Linearized asymptotic stability of rarefaction waves for gas dynamics in thermal and life span of solutions, Comm. Math.Sci. Vol 17 (2019), No. 7, p. 1795 – 1839, DOI: https://dx.doi.org/10.4310/CMS.2019.v17.n7.a3 (with H. Zhong).
- Some results on Newtonian gaseous stars—existence and stability. Acta Math. Appl. Sin. Engl. Ser. 35 (2019), no. 1, 230–254.
- Global solution to initial boundary value problem for gas dynamics in thermal nonequilibrium. J. Differential Equations 265 (2018), no. 5, 1875–1893 (joint with D. Chang) .
- Global solutions to physical vacuum problem of non-isentropic viscous gaseous stars and nonlinear asymptotic stability of stationary solutions. J. Differential Equations 265 (2018), no. 1, 177–236 (joint with G. Hong & C. Zhu) .
- Asymptotic Stability of the Lane-Emden Solutions for the Viscous Gaseous Star Problem with Degenerate Density Dependent Viscosities, (with Z. Xin & H. Zeng), *Comm. Math. Physics,* Vol. 347, Issue 3, pp 657-702 (November 2016).
- Global Existence of Smooth Solutions and Convergence to Barenblatt Solutions for the Physical Vacuum Free Boundary Problem of Compressible Euler Equations with Damping (with H. Zeng), *Comm. Pure & Appl. Math.* Vol. 69, issue 7, pp. 1354 - 1396 (July 2016) DOI: 10.1002/cpa.21562.
- On Nonlinear Asymptotic Stability of The Lane-Emden Solutions for The Viscous Gaseous Star Problem, (with Z. Xin & H. Zeng), *Adv. Math.,* 291. 90 - 182 (March 2016). doi:10.1016/j.aim.2015.12.022
- Existence of Magnetic Compressible Fluid Stars, (with Paul Federbush & Joel Smoller), *Arch. Ration. Mech. Anal.* 215 (2015, Feb.), no. 2, 611-631.
- Well-Posedness for the Motion of Physical Vacuum of the Three-dimensional Compressible Euler Equations with or without Self-Gravitation. *Arch. Ration. Mech. Anal.* 213 (September 2014), no. 3, 763-831 (with Z. Xin & H. Zeng).
- Free Boundary Problem of Incompressible Inviscid Magnetohydrodynamic Flows, *Arch. Ration. Mech. Anal.* 212 (June 2014), no. 3, 805-847 (with C. Hao).
- Dynamics of Shock Fronts for Some Hyperbolic Systems, AMS/IP Studies in Advanced Mathematics. Vol. 51, P. 719-729 (2012).
- On the Euler-Poisson Equations of Self-gravitating Compressible Fluids (with J. Smoller), Nonlinear Conservation Laws and Applications (The IMA Volumes in Mathematics and its Applications, Vol 153) (Edited by A. Bressan, G. Q. Chen, M. Lewicka & D. Wang), Springer, P. 415-432 (2011)
- Stellar Structure, Dynamics and Stability, (Joint with J. Smoller), *Hyperbolic problems & theory, numerics and applications.* Volume 1, 72-85, Ser. Contemp. Appl. Math. CAM, 17, World Sci. Publishing, Singapore, 2012.
- Transonic shock solutions for a system of Euler-Poisson Equations (with Z. Xin), *Comm. Math. Sci.* Vol. 10. No.2, P. 419-462 (2012).

- Stability of Transonic Shock Solutions for One-Dimensional Euler-Poisson Equations (With J. Rauch, C. Xie & Z. Xin), *Arch. Rational Mech. & Anal.* Vol. 202, No. 3, P. 787-827 (2011).
- C^1 Measure Respecting Maps Preserve BV Iff they have Bounded Derivative (with F. Colombini & J. Rauch), *Methods and Applications of Analysis,* Vol 18. No. 2. P. 159-164 (2011).
- Existence and Nonlinear Stability of Rotating Star Solutions of the Compressible Euler- Poisson Equations (with J. Smoller), *Arch. Rational Mech. & Anal.* 191, No.3, 447-496 (2009)
- Nonlinear Dynamical Stability of Newtonian Rotating and Non-rotating White Dwarfs and Rotating Supermassive Stars (with J. Smoller), *Comm. Math. Phys.* 284, 425-457 (2008)
- Layer Dynamics and Phase Transition for Nonlinear Thermoviscoelasticity, *Applicable Analysis,* Volume 87, Issue 6, 2008 , 689 -698
- Convergence to equilibrium rarefaction waves for discontinuous solutions of shallow water wave equations with relaxation (with H. Fan) *Quart. Appl. Math.* 63 (2005), 575-600.
- Rotating fluids with self-gravitation in bounded domains. (With Joel Smoller) *Arch. Rational Mech. Anal.* 173 (2004), no. 3, 345-377.
- Nearly Lipshitzean Divergence Free Transport Propagates Neither Continuity Nor BV Regularity (With F. Colombini and J. Rauch.) *Commun. Math. Sci.* 2 (2004), no. 2, 207-212 .
- Global structure and asymptotic behavior of weak solutions to flood wave equations. (with T. Yang). *J. Differential Equations* 207 (2004), no. 1, 117-160.
- Uniqueness and Nonuniqueness for Nonsmooth Divergence Free Transport, *Seminaire Equations aux Derivees Partielles, Ecole Polytechnique* 2002- 2003. Exp. No. XXII pp 21. (with F. Colombini and J. Rauch) .
- Interface behavior of compressible Navier-Stokes equations with vacuum. *SIAM J. Math. Anal.* 31 (2000), no. 6, 1175-1191 (with Z. Xin & T. Yang)
- Global BV solutions to a p-system with relaxation. J. Differential Equations 162 (2000), no. 1, 174-198. (with R. Natalini & T. Yang).
- Interaction of elementary waves for compressible Euler equations with frictional damping. *J. Differential Equations* 161 (2000), no. 1, 42-86. (with T. Yang).
- Large time behavior of the solutions to a hydrodynamic model for semiconductors. *SIAM J. Appl. Math.* 59 (1999), no. 3, 810-830 (with R. Natalini & Z. Xin).
- Stability of traveling wave solutions for a rate-type viscoelastic system. Advances in nonlinear partial differential equations and related areas (Beijing, 1997), 166-186, World Sci. Publishing, River Edge, NJ, 1998. (with L. Hsiao).
- Global weak solutions for elastic equations with damping and different end states. *Proc. Roy. Soc. Edinburgh Sect. A* 128 (1998), no. 4, 797-807. (with T. Yang)..
- BV solutions and relaxation limit for a model in viscoelasticity. *Proc. Roy. Soc. Edinburgh Sect. A* 128 (1998), no. 4, 775-795. (with R. Natalini).
- Linear stability of shock profiles for a rate-type viscoelastic system with relaxation. *Quart. Appl. Math.* 56 (1998), no. 3, 569-586. (with D. Serre).

- Global BV solutions of compressible Euler equations with spherical symmetry and damping. *J. Differential Equations* 146 (1998), no. 1, 203-225. (with L. Hsiao & T. Yang).
- Large-time behavior of solutions to the equations of one-dimensional nonlinear thermoviscoelasticity. *Quart. Appl. Math.* 56 (1998), no. 2, 201-219. (with L. Hsiao)
- Nonlinear diffusive phenomena of entropy weak solutions for a system of quasilinear hyperbolic conservation laws with damping. *Quart. Appl. Math.* 56 (1998), no. 1, 173-189. (with L. Hsiao).
- On the outer pressure problem of a viscous heat-conductive one-dimensional real gas. *Acta Math. Appl. Sinica (English Ser.)* 13 (1997), no. 3, 251-264.
- Nonlinear stability of shock fronts for a relaxation system in several space dimensions. *J. Differential Equations* 139 (1997), no. 2, 365-408. (with Z. Xin).
- Bounded solutions and periodic solutions of viscous polytropic gas equations. *Chinese Ann. Math. Ser. B* 18 (1997), no. 1, 99-112.
- Asymptotic stability of planar rarefaction waves for the relaxation approximation of conservation laws in several dimensions. *J. Differential Equations* 133 (1997), no. 2, 255- 279.
- Large-time behaviour of solutions for the outer pressure problem of a viscous heat-conductive one-dimensional real gas. *Proc. Roy. Soc. Edinburgh Sect. A* 126 (1996), no. 6, 1277-1296. (with L. Hsiao).
- Nonlinear diffusive phenomena of solutions for the system of compressible adiabatic flow through porous media. *J. Differential Equations* 125 (1996), no. 2, 329-365. (with L. Hsiao).
- Existence of periodic solutions of nonlinear systems with nonlinear boundary conditions. *Acta Math. Sinica (N.S.)* 11 (1995), no. 4, 439-445. (with X. Xiang).
- Global smooth solutions to the Cauchy problem for a viscous heat-conductive one-dimensional real gas. *Acta Math. Sinica (N.S.)* 11 (1995), Special Issue, 201-214.
- Existence, uniqueness and decay of the global weak solutions for a class of parabolic systems with nonlinear boundary conditions. *J. Partial Differential Equations* 7 (1994), no. 4, 359-372.
- Large time behavior of the solutions of nonlinear degenerate diffusion equations. *Acta Math. Sci. (English Ed.)* 13 (1993), no. 2, 167-179. (with L. Xiao).