Chengchun HAO

Professor in Mathematics

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Citizenship

Chinese

Research Interests

Partial Differential Equations

Education

- Ph.D., Academy of Mathematics & Systems Science, CAS,   July 2005
  Thesis Topic: *The Study on Schrödinger-Poisson Systems and Fourth Order Nonlinear Schrödinger Equations*, Supervisor: Professor Ling Hsiao
- B.S. & M.S., Hebei University,   July 1999 & 2002
  Thesis Topic: *Energy Scattering for the Generalized Davey-Stewartson Equations*
  M.S. Supervisor: Professor Baoxiang Wang

Academic Appointments

- Professor, Academy of Mathematics & Systems Science, CAS   Apr 2019 to present
- Associate Professor, AMSS, CAS   May 2008 to Apr 2019
- Research Associate, AMSS, CAS   Jul 2005 to Apr 2008

Visiting Positions

- Visiting Scholar   01/15–02/13/2018
  Department of Mathematics, The City University of Hong Kong, Hong Kong, China
- Visiting Scholar   01/23–02/19/2017
  Department of Mathematics, The City University of Hong Kong, Hong Kong, China
- Visiting Scholar   09/10–09/23/2014
  IMS, The Chinese University of Hong Kong, Hong Kong, China
- Visiting Assistant Professor   03/01–12/31/2007
  School of Mathematics, Georgia Institute of Technology, Atlanta, U.S.A.
- Visiting Scholar   09/01–10/31/2005
  IMS, The Chinese University of Hong Kong, Hong Kong, China
- Visiting Scholar   02/26–04/25/2004
  IMS, The Chinese University of Hong Kong, Hong Kong, China

▬▬ Preprints

1. (with T. Luo) Well-posedness for the linearized free boundary problem of incompressible ideal magnetohydrodynamics equations, submitted, Jul. 2019.

▬▬ Published Books

1. (with B.X.Wang, Z.H.Huo and Z.H.Guo) *Harmonic Analysis Method for Nonlinear Evolution Equations (I)*, World Scientific Pub. Co. Inc., 2011.

▬▬ Journal Publications

−Topics in Free Boundary Problems Arising in Continuum Theories

1. (with T. Luo) Ill-posedness of free boundary problem of the incompressible ideal MHD, *Comm. Math. Phys.*, 376(1), 259-286, 2020.
2. On the motion of free interface in ideal incompressible MHD, *Arch. Ration. Mech. Anal.*, 224(2), 515–553, 2017.
3. (with D. Wang) A priori estimates for the free boundary problem of incompressible neo-Hookean elastodynamics, *J. Differential Equations*, 261(1), 712–737, 2016.
4. Remarks on the free boundary problem of compressible Euler equations in physical vacuum with general initial densities, *Discrete Contin. Dyn. Syst. Ser. B*, 20(9), 2885–2931, 2015.
5. (with T. Luo) A priori estimates for free boundary problem of incompressible inviscid magnetohydrodynamic flows, *Arch. Ration. Mech. Anal.*, 212(3), 805–847, 2014.

−Topics in Compressible Flows with Harmonic Analysis Techniques

6. (with H.-L.Li) Global well-posedness for a viscous liquid-gas two-phase flow model, *SIAM J. Math. Anal.*, **44**(3), 1304–1332, 2012.
7. Global well-posedness for a multi-dimensional chemotaxis model in critical Besov spaces, online first, *Z. Angew. Math. Phys.*, **63**, 825–834, 2012.
8. (with Y.Q.Lin and H.-L.Li) Global well-posedness of compressible bipolar Navier-Stokes-Poisson equations, *Acta Math. Sinica, English Ser.*, **28**(5), 925–940, 2012.
9. Well-posedness to the compressible viscous magnetohydrodynamic system, *Nonlinear Anal. RWA*, **12**, 2962–2972, 2011.
10. Well-posedness for the viscous rotating shallow water equations with friction terms, *J. Math. Phys.*, **52**(2), 023101, 12pp, 2011.
11. Cauchy problem for viscous shallow water equations with a third-order surface tension term, *Disc. Cont. Dyn. Sys., Ser. B*, **13**(3), 593–608, 2010.
12. (with L.Hsiao and H.-L.Li) Cauchy problem for viscous rotating shallow water equations, *J. Diff. Eqns.*, **247**, 3234–3257, 2009.
13. (with H.-L.Li) Global existence for compressible Navier-Stokes-Poisson equations in three and higher dimensions, *J. Diff. Eqns.*, **246**, 4791–4812, 2009.

−Topics in Schrödinger-type Equations

14. (with L.Hsiao and H.-L.Li) Global well-posedness for the Gross-Pitaevskii equation with an angular momentum rotational term, *Math. Meth. Appl. Sci.*, **31**(6), 655–

664, 2008.

15. (with L.Hsiao and H.-L.Li) Global well posedness for the Gross-Pitaevskii equation with an angular momentum rotational term in three dimensions, *J. Math. Phys.*, **48**, 102105, 1–11, 2007.

16. Well-posedness for one-dimensional derivative nonlinear Schrödinger equations, *Comm. Pure Appl. Anal.*, **6**(4), 997–1021, 2007.

17. (with L.Hsiao and B.X.Wang) Wellposedness of Cauchy problem for the fourth order nonlinear Schrödinger equations in multi-dimensional spaces, *J. Math. Anal. Appl.*, **328**(1), 58–83, 2007.

18. (with B.X.Wang and H.Hudzik) Energy scattering for the nonlinear Schrödinger equations with exponential growth in lower spatial dimensions, *J. Diff. Eqns.*, **228**(1), 311–338, 2006.

19. (with L.Hsiao and B.X.Wang) Wellposedness for the fourth order nonlinear Schrödinger equations, *J. Math. Anal. Appl.*, **320**(1), 246–265, 2006.

20. Energy scattering for the generalized Davey-Stewartson equations, *Acta. Math. Appl. Sinica, English Ser.*, **19**(2), 333–340, 2003.

21. Energy scattering for the nonlinear Davey-Stewartson equations (in Chinese), *J. Math. Res. Expo.*, **23**(4), 645–650, 2003.

−Topics in Schrödinger-Poisson Systems

22. The initial boundary value problems for quasi-linear Schrödinger-Poisson equations, *Acta Math. Sci., Ser. B*, **26**(1), 115–124, 2006.

23. (with L.Hsiao) Studies on Schrödinger-Poisson systems (Excerpt of Dissertation), *J. Grad. Sch. of CAS*, **22**(5), 141–146, 2005.

24. (with L.Hsiao) Large time behavior and global existence of solution to the bipolar defocusing nonlinear Schrödinger-Poisson system, *Quart. Appl. Math.*, **62**(4), 701–710, 2004.

25. (with L.Hsiao and H.-L.Li) Modified Scattering for Bipolar Nonlinear Schrödinger-Poisson Equations, *Math. Model. Meth. Appl. Sci.*, **14**(10), 1481–1494, 2004.

26. (with H.-L.Li) On the initial value problem for the bipolar Schrödinger-Poisson systems, *J. Partial Diff. Eqs.*, **17**(3), 283–288, 2004.

−Topics in Quantum Euler-Poisson Systems

27. (with H.-L.Li, G.-J.Zhang and M.Zhang) Long-time self-similar asymptotic of the macroscopic quantum models, *J. Math. Phys.*, **49**, 073503, 1–14, 2008.

28. (with Y.L.Jia and H.-L.Li) Quantum Euler-Poisson system: local existence of solutions, *J. Partial Diff. Eqs.*, **16**(4), 306–320, 2003.

Awards

○ LU Jiaxi Young Talent Award by Chinese Academy of Sciences,   2011
Chinese Academy of Sciences

○ The Nomination Dissertation for National Outstanding Doctoral Dissertations, 2008
Ministry of Education of People's Republic of China

- The Award for Excellent Doctoral Dissertation,   2007
  Chinese Academy of Sciences
- The Special Prize of the President Scholarship,   2004
  Chinese Academy of Sciences
- The First-class Award of the President Scholarship,   2004
  Academy of Mathematics & Systems Science

Research Grants

- 01/2017-12/2020. Principal investigator. The study of free boundary problems in MHD and Navier-Stokes equations and related models,Grant No.:11671384, general project, NSFC.
- 01/2012-12/2015. Principal investigator. Studies on compressible Navier-Stokes equations and related fluid dynamical models. Grant No.11171327, general project, NSFC.
- 01/2012-12/2014. Principal investigator. Special Foundation for the Membership of Youth Innovation Promotion Foundation of Chinese Academy of Sciences.
- 01/2008-12/2008. Principal investigator. Studies on Cauchy Problem of Quantum Hydrodynamics Models. Field Front Project for Talented Youth, Chinese Academy of Sciences.
- 01/2007-12/2009. Principal investigator. Studies on Nonlinear Dispersive Equation and Quantum Hydrodynamic Models. Grant No.10601061, Foundation for the Youth, NSFC.
- 07/2006-06/2009. Principal investigator. Nonlinear Evolutionary Equations and Harmonic Analysis Technique. Scientic Research Startup Special Foundation for the Winner of the Award for Excellent Doctoral Dissertation and the Prize of President Scholarship of CAS.

Teaching Experience

- Instructor for 011D9102Z*: Harmonic Analysis I&II, Spring 2019
- Instructor for 011D9056Z*: Introduction to Harmonic Analysis, Spring 2018
- Instructor for 011D9056Z*: Introduction to Harmonic Analysis, Spring 2016
- Instructor for 219002Z#: Introduction to Harmonic Analysis, Spring & Summer 2012
- Instructor for 219004Z*: Singular Integral and Differentiability Properties of Functions, Fall 2010

Scientific Activities

◇ Reviewer for "Mathematical Reviews" (MR) of AMS since Oct. 2006
◇ Editorial Board of the Journal "Advances in Pure Mathematics"

Referee Service

- *Abstract and Applied Analysis*

- *Acta Applicanda Mathematicae*
- *Acta Mathematicae Applicatae Sinica, English Series and Chinese Series*
- *Acta Mathematica Scientia, Series B: English Edition*
- *Advances in Mathematics (China)*
- *Advances in Pure Mathematics* **(APM)**
- *Applicable Analysis*
- *Archive for Rational Mechanics and Analysis* **(ARMA)**
- *Boundary Value Problems*
- *Communications in Mathematical Sciences* **(CMS)**
- *Discrete and Continuous Dynamical Systems - Series B* **(DCDS-B)**
- *Journal of Beijing University of Technology*
- *Journal of Differential Equations* **(JDE)**
- *Journal of Function Spaces and Applications*
- *Journal of Inequalities and Applications*
- *Journal of Mathematical Physics* **(JMP)**
- *Journal of Mathematical Analysis and Applications* **(JMAA)**
- *Journal of Partial Differential Equations* **(JPDE)**
- *Journal of Sichuan Normal University*
- *Journal of Systems Science and Complexity, English Series* **(JSSC)**
- *Kinetic and Related Models* **(KRM)**
- *Mathematische Annalen*
- *Mathematical Methods in the Applied Sciences* **(M2AS)**
- *Mathematische Zeitschrift* **(Math.Z.)**
- *Nonlinear Analysis: Real World Applications* **(NA-RWA)**
- *Nonlinearity*
- *SCIENCE CHINA Mathematics*
- *SIAM Journal of Mathematical Analysis* **(SIMA)**
- *The Royal Society of Edinburgh Proceedings A*
- Zeitschrift für angewandte Mathematik und Physik **(ZAMP)**
- *Zeitschrift fur Angewandte Mathematik und Mechanik* **(ZAMM)**
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