Curriculum Vitae

Xiaoxiang Chai

May, 2022

Email: *xxchai@kias.re.kr*

Website: https://chxiaoxn.github.io

Address: KIAS, 85 Hoegiro, Dongdaemun-gu, Seoul 02455, South Korea

Education

2015 - July 2018, PhD in Mathematics, Department of Mathematics, The Chinese University of Hong Kong, Hong Kong

Advisor: Prof. Martin Man-chun Li

Thesis title: *Some aspects of the minimal surface theory*

2012 - 2015, Master of Science (supervisor: Prof. Jiaxin Hu), Tsinghua University, Beijing, China.

Master Thesis title: *First Eigenvalue Problem of Dirichlet forms*

2008 - 2012, Bachelor of Science, Sun Yat-sen University, Guangzhou, China.

Work Experience

Mar 2019 - Now, Research Fellow at Korea Institute for Advanced Study, Seoul, South Korea. Host: Mar 2019 - Feb 2020, Prof. Choe Jaigyoung.

Feb 2020 - now, host Prof. Inkang Kim.

Research Interests

Relativity and related geometry: Positive mass theorem, geometry of scalar curvature;

Minimal surfaces: min-max methods, free boundary minimal surface, geometric measure theory.

Publications

1. Willmore type inequality using monotonicity formulas. *Pacific Journal of Mathematics*. arXiv:1811.05617.

2. Evaluation of the mass of an asymptotically hyperbolic manifold. Accepted in J. of Geometric Analysis. arXiv:1811.09778

3. (with Inkang Kim) Scalar curvature, mean curvature and harmonic maps to the circle. Accepted in Ann. Global Analysis and Geometry. arXiv:2103.09737

Preprints

1. Minkowski formula of conformal Killing-Yano 2-forms.

2. (with Martin Man-chun Li) Marginally outer trapped surface with a free boundary. *In preparation*.

3. (with Martin Man-chun Li) A free boundary MOTS proof of a spacetime positive mass theorem.*Work in progress*.

4. Positive mass theorem and free boundary minimal surfaces. arXiv:1811.06254.

5. Two quasi-local masses evaluated on surfaces with boundary. arXiv:1811.06168.

6. Inverse mean curvature flow with a free boundary in hyperbolic space. arXiv:2203.08467

7. A perturbation of the spacetime Laplacian equation. arXiv:2107.12784

8. Hypersurfaces of prescribed null expansion. arXiv:2107.12782

9. Mass and polyhedra in asymptotically hyperbolic manifolds. arXiv:2102.10715

10. Asymptotically hyperbolic manifold with a horospherical boundary. arXiv:2102.08889

Academic activities

11. Apr 14, 2022. Invited talk *Inverse mean curvature flow with a free boundary in hyperbolic space*. Department of Mathematics, Pusan National University, Busan, South Korea.

10. March 1-3, 2022. Invited talk *mixed boundary value problems in Gromov dihedral rigidity*. Conference of *Geometric analysis on manifolds, fractals and metric spaces*, Yamagata University, Japan,

9. Aug 13, 2020, invited talk *Free boundary MOTS: existence theory*. Nankai University.

8. Nov 8-11, 2019. Participation *of Geometric Analysis Seminar for Young Scholars*. Sun Yat-sen University.

7. Oct 22-24. Jeonbuk National University. Academic visit. Host: Prof. Hojoo Lee.

6. Sep 23-26, 2019, International Conference on Analysis and PDEs on Manifolds and Fractals, Nankai University. Invited talk on *Positive mass theorem and free boundary minimal surfaces*.

5. Jun 3, 2019. KIAS Three W Seminar on *Constructing a minimal surface in a sphere with an arbitrary metric*.

4. Sep 2018, Department of Mathematics, Fudan University, academic visit.

3. Sep 2018, Department of Mathematics, Nankai University, academic visit.

2. Aug 2018, Department of Mathematics, Peking University, invited talk on *Positive mass theorem and free boundary minimal surfaces*.

1. June, 2018, Department of Mathematics, Sun Yat-Sen University (Zhuhai Campus), invited talk on *Positive mass theorem and free boundary minimal surfaces*

Teaching Assistant Duties

10. 2017 - 2018 Term 2, MATH1010I University Mathematics, CUHK.

9. 2017 - 2018 Term 1, MATH1010 University Mathematics, CUHK.

8. 2016 - 2017 Term 1, MATH1010 University Mathematics, CUHK.

7. 2015 - 2016 Term 1, MATH1510 Calculus for Engineers, CUHK.

6. 2015 - 2016 Term 1, MATH1020 General Mathematics, CUHK.

5. 2014 - 2015 Term 2, Complex function theory (10420252),Tsinghua University.

4. 2014 - 2015 Term 1, Methods of Mathematical Physics (10420262), Tsinghua University.

3. 2013 - 2014 Term 2, Linear Algebra (10421102), Tsinghua University.

2. 2013 - 2014 Term 1, Linear Algebra (10421113), Tsinghua University.

1. 2012 - 2013, Calculus A (10421065), Tsinghua University.

Awards

2014, Awards of Excellence (based on a GPA of 90/100), Department of Mathematics, Tsinghua University.