Fang-Rong ZHAN | Curriculum Vitae

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Education

Department of Mathematics, Jinan University **Sep 2019-Jun 2023 (Expected)**
Bachelor in Mathematics & Applied Mathematics *Guangzhou, Guangdong, China*
GPA: 3.85 (2 out of 30)

Interests

Geometry and Topology

Research Experience

The Differential form of Equivariant Euler class **Aug 2022 — Present**
Advisor: Associate Prof. Bai-Ling WANG (Australian National University)

- We are planning to give the equivariant differential form of equivariant Euler class in finite dimensional case and virtual Euler class in infinite dimensional case.
- Currently reading Tu's *Introductory Lectures on Equivariant Cohomology* and Kai Cieliebak et al's *Equivariant moduli problems, branched manifolds, and the Euler class*,Topology 42 (2003) 641 –700.

Combinatorial Knot Theory (A Polymath Jr. REU program) **July — Aug 2022**
Advisor: Associate Prof. Marion Campsi (San Jose State University)

- Exposed to the basic notions and theorems in knot theory. Read C. A. Adams's *The Knot Book*. Studied serveral recent papers involving the stick number of a knot.
- Derived serveral relationship of the stick number of a knot between in the cubic lattice and in the simple hexogonal lattice. Categorized knots with small stick number in simple hexogonal lattice.
- Paper in preparation, might be published on arXiv.

Morse Theory and Its Applications **2021**
Advisor: Prof. Hai-Long HER (Jinan University)

- Foster deeper knowledge towards algebraic topology and differential geometry by participating and presenting in serveral graduate-level seminars.
- Studied how Morse functions relates to the topology of a manifold, as well as how to define Morse homology. Exposed to various application of Morse theory, including Bott's periodicity theorem, the cancellation lemma of h-cobordism theory.
- Summary published on https://zhanfangrong.cn/.

Summer School and Mini-Course

Summer School on Geometry and Topology **July 2022**
Sichuan University

- Algebraic Topology
  - Lecturer: Prof. Bin ZHANG (Sichuan Univ.)
  - Homology, cohomology, Bundles and characteristic classes, K-theory.

Mini-Course on Gauge Theory **Dec 2021 — Jan 2022**
Jinan University

- Lecturer: Associate Prof. Bai-Ling WANG (Aus. National Univ.)
- Text: S. K. Donaldson et al's *The Geometry of 4-Manifold*.
- The differential geometry of principal bundles. Gauge transform. Yang-Mills connection.
- [My note published on https://zhanfangrong.cn]

Summer School on Differential Geometry **Aug 2021**

Beijing International Center for Mathematical Research, Peking University

- Complex Geometry
  - Lecturer: Dr. Ke-Wei ZHANG (PKU).
  - Text: Ch.0-1 from Griffiths-Harris's *Principles of Algebraic Geometry*; R. O. Wells's *Differential Analysis on Complex Manifolds*.
  - Functions of serveral complex variables, sheaf theory & Čech cohomology, complex manifold, holomorphic line bundles, Kähler manifold, Hodge theory, Kodaira vanishing theorem.
  - Got full marks.
- Riemannian Geometry
  - Lecturer: Prof. Zhen-Lei ZHANG (Capital Normal Univ.)
  - Rauch comparision, manifolds with non-positive curvature, Toponogov comparison theorem, Bishop-Gromov Relative Volumn Comparison

Mini-Course on Symplectic Geometry **Dec 2020**

Jinan University

- Lecturer: Prof. Bai-Ling WANG (Aus. National Univ.)
- Text: *Introduction to Symplectic Topology* by McDuff & Salamon.
- Symplectic linear space, symplectic manifold, Hamiltonian action, Arnold's conjecture, Floer homology.

Seminar

Yang-Mills Theory in 2D **Spring 2022**

Jinan University

- Advisor: Prof. Hai-Long HER.
- Read Atiyah-Bott's '82 paper *The Yang-Mills Equations over Riemann surfaces*.
- Key presenter.

Representation Theory **Spring 2021**

Sun Yat-Sen University

- Advisor: Prof. Chang-Zheng LI.
- Read Lec. 1-7 from *Representation Theory (GTM129)* by W. Fulton & J. Harris.
- Studied the representation of $\mathfrak{S}_d, \mathfrak{A}_d, \mathrm{GL}_2(\mathbb{F}_q)$.

Galois Theory **Fall 2020**

Jinan University

- Read Ch. 1-5 from *Fields and Galois Theory* by J. S. Milne.
- Exposed to Galois theory and the application towards the insolvability of high-degree polynomial.
- A mentor-free reading group consisting of interested students totally organized by me. Also appeared as the key speaker.

Awards & Scholorship

2021.11: The 13th Chinese Mathematics Competition(Guangdong), 3rd prize

2021.10: 2021 "LI Yu-Bei" Excellent Student Scholorship for Dept. of Math. of JNU, 3000 RMB

2021.06: 2021 Jinan University Programming Contest, 2nd prize

2021.05: 2021 ACM-ICPC East-Asian Regional Contest(Yinchuan), bronze prize

2020.06: 2020 Jinan University Programming Contest, 1st place

Skills & Others

Programming: C++(Advanced), LaTeX(Skillful), Matlab(Skillful), Mathematica(Basic), Coq(Learning), LEAN(Learning)

Language: Mandarin(Native), English(CET-6:511, TOEFL TBA), Japanese(Learning), French(Learning)