

# YUAN CHEN

## PERSONAL DATA

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## EDUCATION

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June 2021	<b>The George Washington University</b> M.S. in Statistics, <b>GPA: 4.0/4.0</b> <b>Certification:</b> Graduate Teaching Assistant Certificate <b>Course Work:</b> Mathematical Statistics I, Mathematical Statistics II, Regression Analysis, Longitudinal Data Analysis, Survival Analysis, <b>Ph.D. Level:</b> Stochastic Process, (Modern) Probability, Advanced Statistical Theory I, Martingale and Topic in Probability
June 2021	<b>The George Washington University</b> Cert. in Mathematics, <b>GPA: 4.0/4.0</b> <b>Course Work:</b> Real Analysis, Measure Theory and Integration, Numerical Analysis (Graduate), (Modern) Partial Differential Equations ( <i>University of Maryland</i> ), Functional Analysis, Numerical Methods for Partial Differential Equations, Combinatorics, The Finite Element Method for Problems in Physics (Coursera)
June 2019	<b>Hohai University</b> B.E. in Environmental Science, <b>GPA: 90.7/100; Rank: the 1<sup>st</sup> place</b> <b>Course Work:</b> Calculus I & II, Linear Algebra, Hydraulics, Data and Analysis, Machine Learning, Environmental Hydraulics, Geographical Information System, Bayesian Statistics I & II (Coursera), Practical Time Series Analysis (Coursera)

## RESEARCH INTERESTS

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1. Numerical Methods for Partial Differential Eq.s: Finite Element Method
2. Stochastic Methods for Partial Differential Eq.s: Deep Ritz Method, Monte Carlo Method
3. Interface problems: Partial Differential Eq.s with discontinuities coefficients across 'interfaces'
4. Immersed Finite Element Method (IFEM) for interface problems
5. Applications of statistics and economics on environmental problems

## PUBLICATIONS

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5. Y. CHEN, S. HOU, AND X. ZHANG. *Error Estimates for a Partially Penalized Immersed Finite Element Method for Elastodynamic Interface Problems*, (2021+), preprint.
4. Y. CHEN, H. WANG, H. YAN, D. LIANG, X. HE, AND R. LI. *A Novel View to Understand the Spatiotemporal Variation of Nutrients in Urban River Networks from Energy Scale*, (2021+), under review.
3. Y. CHEN AND X. ZHANG. *A  $\mathcal{P}_2$ - $\mathcal{P}_1$  Partially Penalized Immersed Finite Element Method for Stokes Interface Problem Based on a Least Square Construction*, Int. J. Numer. Anal. Mod., 18(2021), no. 1, 120-141.
2. Y. CHEN, S. HOU, AND X. ZHANG. *A Bilinear Partially Penalized Immersed Finite Element Method for Elliptic Interface Problems with Multi-domains and Triple Junction Points*, Results Appl. Math., 8(2020), 100100.
1. Y. CHEN, S. HOU, AND X. ZHANG. *An Immersed Finite Element Method for Elliptic Interface Problems with Multi-domain and Triple Junction Points*, Adv. Appl. Math. Mech., 11(2019), no. 5, 1005-1021.

## TALKS AND POSTERS

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2. Immersed Finite Element Methods for Interface Problems with Multi-Domains and Triple-Junction Points. **GW Research Day**, The George Washington University, D.C. (April 2020, Online).
1. Immersed Finite Element Methods for Interface Problems with Multi-Domains and Triple-Junction Points. **AMS Southeastern Sectional Meeting**, University of Virginia, VA (March 2020, Cancelled).

## TEACHING EXPERIENCES

Fall 2020	<b>MATH 1051, Teaching Assistant, GWU</b> Assisting Professor Michael F. Moses in course MATH 1051: Finite Math for the Social and Management Sciences. Lead three Recitation sessions (20 people each) every week and hold regular office hour.
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## RESEARCH EXPERIENCES

Present	<b>Research on High Order IFEM for Stokes Interface Problem on Actual Interface</b> Advised by Prof. Xu Zhang <ul style="list-style-type: none"> <li>Constructed an immersed Taylor-Hood <math>\mathcal{P}_2\text{-}\mathcal{P}_1</math> finite element space according to actual interface using least square construction for stokes interface problems</li> <li>Tested approximation capability of the space on numerical examples, both velocity and pressure showed optimal order convergence in <math>L_2</math> and semi-<math>H_1</math> norm under moderate and high contrast</li> <li>Designed a weak formulation with penalty terms. Extra ghost penalty terms are added to stabilize the scheme, validated optimal convergence rate of this scheme on numerical examples.</li> <li>Vectorized program of proposed method, speed up CPU time significantly by NumPy in Python</li> </ul>
May 2020	<b>Research on Time-dependent Elasticity Interface Problem</b> Co-advised by Prof. Xu Zhang and Prof. Songming Hou <ul style="list-style-type: none"> <li>Designed a fully discrete scheme for time-dependent elasticity interface problems based on Partially Penalized Immersed Finite Element Method (PIFEM)</li> <li>Implemented multi-processing programs to verify the proposed scheme on numerical examples, showed optimal order convergence in <math>L_2</math> and semi-<math>H_1</math> norm using NumPy, SciPy package in Python</li> <li>Proved the unconditional stability for Symmetric case. Completed a-priori error estimation for proposed scheme: proved the optimal convergence of numerical solution in energy norm and <math>L^2</math> norm under the standard piecewise <math>H^2</math> regularity assumption of exact solution</li> </ul>
Nov. 2019	<b>Improved Research on Multi-domain Elliptic Interface Problem</b> Advised by Prof. Songming Hou <ul style="list-style-type: none"> <li>Constructed new bilinear IFE functions on elements intersected with multiple interfaces or with triple-junction points to accommodate interface jump conditions.</li> <li>Enriched the local approximating spaces by adding up to three local flux basis functions. Verified the Lagrange interpolations converge optimally in <math>L_2</math>, semi-<math>H_1</math> norm with numerical examples</li> <li>Designed a weak formulation with additional penalty terms on both element edges and interface</li> <li>Tested optimal order convergence rate of partial penalized IFEM solutions in <math>L_2</math>, semi-<math>H_1</math> norm without deterioration</li> </ul>
Nov. 2018	<b>Research on Multi-domain Elliptic Interface Problem</b> Advised by Prof. Songming Hou <ul style="list-style-type: none"> <li>Established a immersed finite element space by modifying local basis functions to accommodate interface conditions with multi-domains and triple-junction points</li> <li>Enriched proposed space by adding local flux basis functions to handle with the non-homogeneous flux jump interface condition. Verified the Lagrange interpolations converge optimally in <math>L_2</math>, semi-<math>H_1</math> norm with numerical examples</li> <li>Implemented proposed method on three numerical examples using NumPy package in Python to show the optimal order convergence of IFE solutions in <math>L_2</math> and semi-<math>H_1</math> norm</li> </ul>

## SCHOLARSHIPS & CERTIFICATES

• GWU Department of Mathematics Award of Graduate Assistantship	2020
• HOHAI UNIVERSITY Honored Student Scholarship	2016, 2018, 2019
• HOHAI UNIVERSITY Science & Technology Innovation Scholarship	2019
• Certificate of Honored Achievement in Bayesian Statistics I & II, Coursera online course by UCSC	2018
• Certificate of Achievement in Practical Time Series Analysis, Coursera online course by SUNY	2018
• 3 <sup>rd</sup> Prize of China Undergraduate Mathematical Contest in Modeling	2017

## SKILLS

<b>Programming</b>	C/C++, Python, R, MySQL, $\text{\LaTeX}$ , VB, MATLAB
<b>Vectorization</b>	Python(NumPy), MATLAB
<b>Data Analysis</b>	Python (pandas, matplotlib, geopy), R (ggplot, dplyr, tidyr), QGIS, ECHARTS, D3, sas
<b>Sci. Computing</b>	Python (NumPy, SciPy, SymPy, multiprocessing), MATLAB, Mathematica
<b>Deep Learning</b>	Python (Numpy, PyTorch, TensorFlow)