DOHYUN KIM

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Nationality: **Korean**

RESEARCH INTEREST

Finite Element Methods, Numerical Optimization, Nonconforming Methods, Fluid Dynamics, Scientific Computing, Reinforcement Learning

PROFESSIONAL EXPERIENCE

Postdoctoral Research Associate | Brown University, USA
Supervisor: Brendan Keith, Brown University
2023 JAN –

Postdoctoral Researcher | Hong Kong Centre for Cerebro-Cardiovascular Health Engineering, Hong Kong
Supervisor: Raymond Chan, City University of Hong Kong
Co-supervisor: Lina Zhao, City University of Hong Kong
2021 DEC – 2022 OCT

Postdoctoral Researcher - Computational Science and Engineering | Yonsei University, South Korea
Supervisor: Eun-Jae Park, Yonsei University
2021 MAR – 2021 DEC

EDUCATION

Ph.D. Computational Science and Engineering – Mathematics | Yonsei University, South Korea
Advisor: Eun-Jae Park, Yonsei University
2015 MAR – 2021 FEB

B.S. Mathematics | Hanyang University, South Korea
2011 MAR – 2015 FEB

AWARDS AND GRANTS

Excellent Dissertation Award | Korean Mathematical Society 2021

Excellent Thesis Award | Yonsei University 2021

Excellent Paper Encouragement Award | Yonsei University 2019

Poster Excellence Award| KSIAM 2017

KSIAM-MathWorks Problem Challenge-Award of Excellence | KSIAM 2018

BK21Plus Scholarship | Brain Korea 21 Plus (2015-2020)

Research Competency Scholarship | Yonsei University 2019

PUBLICATIONS

HIGH-PERFORMANCE FINITE ELEMENTS WITH MFEM

ArXiV Preprint

Julian Andrej, Nabil Atallah, Jan-Phillip Bäcker, John Camier, Dylan Copeland, Veselin Dobrev, Yohann Dudouit, Tobias Duswald, Brendan Keith, **Dohyun Kim**, Tzanio Kolev, Boyan Lazarov, Ketan Mittal, Will Pazner, Socratis Petrides, Syun'ichi Shiraiwa, Mark Stowell, Vladimir Tomov

DYNAMO: MULTI-AGENT REINFORCEMENT LEARNING FOR DYNAMIC ANTICIPATORY MESH OPTIMIZATION WITH APPLICATIONS TO HYPERBOLIC CONSERVATION LAWS

Journal of Computational Physics (IF: 5.3), Accepted (2024)

Tarik Dzanic, Ketan Mittal, **Dohyun Kim**, Jiachen Yang, Socratis Petrides, Brendan Keith, Robert Anderson

Pressure-robust staggered DG methods for the Navier-Stokes equations on general meshes

ArXiV Preprint

Dohyun Kim, Lina Zhao, Eric Chung, Eun-Jae Park

Staggered DG method with small edges for Darcy flows in fractured porous media

Journal of Scientific Computing (IF: 2.592), 90, Article number 83 (2022)

Lina Zhao, **Dohyun Kim**, Eun-Jae Park, Eric Chung

Review and implementation of staggered DG methods on polygonal meshes

Journal of the Korean Society and Applied Mathematics, 25, pp. 66-81 (2021)

Dohyun Kim, Lina Zhao, Eun-Jae Park

Polygonal staggered discontinuous Galerkin methods
Oberwolfach Reports, 3/2021, 25-27 (2021)
Eun-Jae Park, Lina Zhao, **Dohyun Kim**

Morley finite element methods for the stationary quasi-geostrophic equation
Computer Methods in Applied Mechanics and Engineering (IF: 6.756), 375, 113639 (2021)
Dohyun Kim, Amiya K. Pani, Eun-Jae Park

Staggered DG methods for the pseudostress-velocity formulation of the Stokes equations on general meshes
SIAM Journal on Scientific Computing (IF: 2.373), 42, pp. A2537-A2560 (2020)
Dohyun Kim, Lina Zhao, Eun-Jae Park

Error estimates of B-spline based finite-element methods for the stationary quasi-geostrophic equations of the ocean
Computer Methods in Applied Mechanics and Engineering (IF: 6.756), 335, pp. 255-272 (2018)
Dohyun Kim, Tae-Yeon Kim, Eun-Jae Park, Dong-wook Shin

ORGANIZED CONFERENCE

Mini-symposium: Recent developments in mathematical analysis and numerics for incompressible flow and related problems |2022 SIAM Annual Meeting
June 11-15, 2022, Pittsburgh, Pennsylvania, USA (Online-Offline Hybrid)

INVITED TALKS

DynAMO: Dynamic Anticipatory Mesh Optimization with Reinforcement Learning | 17th U. S. National Congress on Computational Mechanics
July 23-27, 2023, Albuquerque, NM, U.S.

DynAMO: Dynamic Anticipatory Mesh Optimization with Reinforcement Learning | 9th International Conference on High Order Finite Element and Isogeometric Methods
May 29-June 1, 2023, Larnaca, Cyprus

A pressure-robust staggered DG methods for the stationary Stokes and Navier-Stokes problems | AMS Sectional Meeting: 2023 Spring Southeastern Sectional Meeting
March 18-19, 2023, Atlanta, GA, U.S.

Pressure-Robust Staggered DG Method for Navier-Stokes Equations | SIAM Conference on Analysis of Partial Differential Equations (PD22)
March 14-18, 2022, Berlin, Germany (Online)

Staggered DG Methods on General Meshes | SIAM Conference on Mathematical & Computational Issues in the Geosciences
June 21-24, 2021, Italy (Online)

Staggered DG method for Darcy flows in fractured porous media on general meshes | International Conference on Computational Science 2021
June 16-18, 2021, Krakow, Poland (Online)

Staggered discontinuous Galerkin methods for the Stokes equations on general polygonal meshes | The 26th International Domain Decomposition Conference
December 7-12, 2020, Hong Kong, China (Online)

Error estimates of B-spline based finite-element methods for the stationary quasi-geostrophic equations of the ocean | The Week of Applied Mathematics and Mathematical Modelling
October 7-11, 2019, Vladivostok, Russia

A C0-discontinuous Galerkin method for quasi-geostrophic equations | International Conference on Computational Mathematics – Advances in Computational PDEs
September 29-October 2, 2018, Seoul, South Korea

PRESENTATIONS

(POSTER) DynAMO: Dynamic Anticipatory Mesh Optimization with Reinforcement Learning | Mathematical and Scientific Machine Learning
Jun 5-9, 2023, Providence, RI, U.S.

Pressure robust staggered DG methods | KSIAM 2021 Annual Meeting
Dec 2-5, 2021, Busan, Korea (Online-Offline Hybrid)

A staggered DG method for the Darcy flow in fractured porous media on polygonal meshes | International Conference on Spectral and High Order Methods
July 12-16, 2021, Vienna, Austria (Online)

Staggered DG method with small edges for Darcy flows in fractured porous media| KSIAM 2021 Spring Meeting
June 25-27, 2021, Gangneung, South Korea

C0-interior penalty methods for stationary quasi-geostrophic equations | KSIAM 2018 Annual Meeting
November 2-4, 2018, Jeju, South Korea

Finite element methods for wind-driven large scale ocean circulation with spline basis | 2017 KSIAM Annual Meeting
November 3-5, 2017, Busan, South Korea

(POSTER) B-spline based finite element method for a large scale ocean circulation | KSIAM 2017 Spring Conference Joint with EASIAM
June 23-24, 2017, Seoul, South Korea

Discontinuous Galerkin methods for Hodgkin-Huxley model | 2017 KMS Spring Meeting
April 28-30, 2017, Gwangju, South Korea

COMPUTER SKILLS

- MATLAB
- Python
- C++

NATIONALITY & LANGUAGE

- Advanced level in **English**
- Native proficiency in **Korean**