

Hyea Hyun Kim

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RESEARCH INTERESTS	Numerical methods for partial differential equations, Domain decomposition methods, Scientific machine learning, Parallel computing, Discontinuous Galerkin methods, Mortar methods, Multi-scale problems, Multi-physics problems	
EDUCATION	Ph. D., Applied Mathematics Korea Institute of Science and Technology (KAIST), Daejeon, Korea <i>Thesis: Preconditioners for FETI-DP formulations with mortar methods.</i> <i>Advisor:</i> Professor Chang-Ock Lee	February 2004
	M.S., Applied Mathematics Korea Institute of Science and Technology (KAIST), Daejeon, Korea <i>Thesis: Numerical methods for Navier-Stokes equations.</i> <i>Advisor:</i> Professor Hi Jun Choe	1999
	B.S., Mathematics Pohang Institute of Science and Technology (POSTECH), Pohang, Korea	1997
PROFESSIONAL EXPERIENCE	Kyung Hee University <i>Professor</i>	March, 2017 – Present
	Kyung Hee University <i>Associate Professor</i>	March, 2012 – February, 2017
	Kyung Hee University <i>Assistant Professor</i>	September, 2010 – February, 2012
	SungKyunKwan University <i>Assistant Professor</i>	March, 2010 – August, 2010
	Chonnam National University <i>Assistant Professor</i>	September, 2007 – February, 2010
	National Institute for Mathematical Sciences <i>Researcher</i>	August, 2006 – September, 2007
	Courant Institute of Mathematical Sciences New York University <i>Research Fellow</i>	February, 2006 – August, 2006
	Korea Institute of Science and Technology Division of Applied Mathematics <i>Postdoctoral Fellow, Instructor</i> (Advanced Numerical Analysis, a graduate course)	September, 2005 – January, 2006
	Courant Institute of Mathematical Sciences New York University <i>Research Fellow</i>	September, 2004 – August, 2005

Korea Institute of Science and Technology
Division of Applied Mathematics
Postdoctoral Fellow

March, 2004 – August, 2004

Korea Institute of Science and Technology
Division of Applied Mathematics
Teaching Assistant, Research Assistant, Instructor
(Linear Algebra, Calculus, and Applied Mathematics)

1997 – 2004

Samsung Advanced Institute of Technology, Yongin, Korea
Internship

June, 1999 – September, 1999

Fluid simulation between the high density hard drive and
the magnetic reader using Monte-Carlo methods

ACADEMIC
SERVICES

**A member of International Scientific Committee for the International Domain Decomposition
Conferences** **2013 – Present**

**A member of Editorial Board for Journal of the Korean Society for Industrial and Applied Math-
ematics** **2015 – Present**

SELECTED
PUBLICATIONS

"Efficient mesh generation utilizing an adaptive body centered cubic mesh", with Hee Jun Yang
and Kiwan Jeon, *J. Comput. Phys.* 436 (2021)

"An adaptive BDDC method enhanced with prior selected primal constraints", with Junxian Wang,
Computers & Mathematics with Applications 80 (2020) no.8, pp.1928-1943.

"A two-level overlapping Schwarz method with energy-minimizing multiscale coarse basis func-
tions", with Eric Chung and Junxian Wang, *J. Comput. Appl. Math.* 370 (2020)

"A hybrid staggered discontinuous Galerkin method for KdV equations", with Hee Jun Yang, *J.*
Sci. Comput. 77 (2018) no. 1, pp. 502–523.

"BDDC and FETI-DP preconditioners with adaptive coarse spaces for three-dimensional elliptic
problems with oscillatory and high contrast coefficients", with Eric Chung and Junxian Wang, *J.*
Comput. Phys. 349 (2017), pp. 191–214.

"Approximation of macroscopic conductivity for a multiscale model by using mortar methods",
with Ji Eun Kim, *J. Comput. Phys.* 336 (2017), pp. 275–287.

"Analysis of a staggered discontinuous Galerkin method for linear elasticity", with Jeonghun J.
Lee, *J. Sci. Comput.* 66 (2016), no. 2, pp. 625–649.

"Staggered discontinuous Galerkin methods for the incompressible Navier-Stokes equations", with
Siu Wun Cheung, Eric Chung, and Yue Qian, *J. Comput. Phys.* 302 (2015), pp. 251–266.

"A BDDC algorithm with enriched coarse spaces for two-dimensional elliptic problems with oscil-
latory and high contrast coefficients", with Eric T. Chung, *Multiscale Model. Simul.* 13 (2015), no.
2, pp. 571–593.

"A deluxe FETI-DP algorithm for a hybrid staggered discontinuous Galerkin method for H(curl)-
elliptic problems", with Eric T. Chung, *Internat. J. Numer. Method Engrg.* (2014) Vol. 98, pp.

1–23.

“A staggered discontinuous Galerkin method for the Stokes system”, with Eric T. Chung and Chak Shing Lee, *SIAM J. Numer. Anal.* (2013) Vol. 51, pp. 3327–3350.

“Two-level overlapping Schwarz algorithms for a staggered discontinuous Galerkin method”, with Eric T. Chung and Olof B. Widlund, *SIAM J. Numer. Anal.* (2013) Vol. 51, pp. 47–67.

“A two-level nonoverlapping Schwarz algorithm for the Stokes problem: Numerical study”, with Chang-Ock Lee, *Comput. Methods Appl. Mech. Engrg.* (2012) Vol. 223-224, pp. 153–160.

“A two-level nonoverlapping Schwarz algorithm for the Stokes problem without primal pressure unknowns”, with Chang-Ock Lee, *Internat. J. Numer. Method Engrg.* (2011) Vol. 88, no. 13, pp. 1390–1410.

“A FETI-DP formulation for the three-dimensional Stokes problem without primal pressure unknowns”, with Chang-Ock Lee, *SIAM J. Sci. Comput.* (2010) Vol. 32, no. 6, pp. 3301–3322.

“A FETI-DP formulation for the Stokes problem without primal pressure components”, with Chang-Ock Lee and Eun-Hee park, *SIAM J. Numer. Anal.* (2010) Vol. 47, no. 6, pp. 4142–4162.

“A BDDC method for mortar discretizations using a transformation of basis”, with Maksymilian Dryja and Olof B. Widlund, *SIAM J. Numer. Anal.* (2008) Vol. 47, no. 1, pp. 136–157.

“A FETI-DP formulation of three dimensional elasticity problems with mortar discretization”, *SIAM J. Numer. Anal.* (2008) Vol. 46, no. 5, pp. 2346–2370.

“A BDDC algorithm for mortar discretization of elasticity problems”, *SIAM J. Numer. Anal.* (2008) Vol. 46, no. 4, pp. 2090–2111.

“Two Level Schwarz algorithms, using overlapping subdomains, for mortar finite element methods”, with Olof B. Widlund, *SIAM J. Numer. Anal.* (2006) Vol. 44, no. 4, pp. 1514–1534.

“A Neumann-Dirichlet preconditioner for a FETI-DP formulation of the two-dimensional Stokes problem with mortar methods”, with Chang-Ock Lee, *SIAM J. Sci. Comput.* (2006) Vol. 28 no. 3, pp. 1133–1152.

“A preconditioner for the FETI-DP formulation with mortar methods in two dimensions”, with Chang-Ock Lee, *SIAM J. Numer. Anal.* (2005) Vol. 42 no. 5, pp 2159–2175.

“Meshless method for the stationary incompressible Navier-Stokes equations”, with Hi Jun Choe, Do Wan Kim and Yongsik Kim, *Discrete and Continuous Dynamical Systems Series B*, 1 (2001) no. 4, pp 495–526.

SELECTED
PRESENTATIONS

Domain decomposition algorithms for physics-informed neural networks, *the 26th International Conference on Domain Decomposition Methods*, December 9, 2020, The Chinese University of Hong Kong, China.

Domain decomposition preconditioners for multiscale problems, *An invited talk in the division of Applied Mathematics, 2019 KMS Spring Meeting*, April 19, 2019, Kangwon National University, Korea.

Fast solvers for elliptic problems with highly random and high contrast coefficients, *The 7th China-Japan-Korea Joint Conference on Numerical Mathematics*, August 22, 2018, Kanazawa, Japan.

Fast solvers for multiscale problems, WCCM2016, July 27, 2016, Seoul, Korea.

Staggered discontinuous Galerkin method and FETI-DP preconditioners for the Stokes system, WCCM2014, July 23, 2014, Barcelona, Spain.

A staggered discontinuous Galerkin method for the Stokes system and its fast solvers by domain decomposition methods, *Center for Computational and Technology*, October 15, 2013, Louisiana State University(LSU), USA.

A staggered discontinuous Galerkin method for the Stokes system and its fast solvers by domain decomposition methods, *In Numerical Analysis Seminar, Courant Institute*, October 11, 2013, New York University(NYU), USA.

A deluxe FETI-DP preconditioner for a staggered discontinuous Galerkin formulation of H(curl) in two dimensions, *The 22nd International Conference on Domain Decomposition Methods*, September 16-20, 2013, Università della Svizzera Italiana, Lugano, Switzerland.

A staggered discontinuous Galerkin method for the Stokes system and its fast solvers, *An invited talk to Colloquium, Department of Mathematics*, January 30, 2013, University of Kansas, USA.

Recent advances in domain decomposition methods for the Stokes problem, *An invited speaker to the 21st International Conference on Domain Decomposition Methods*, June 2012, Rennes, France.

Domain decomposition algorithms for the Stokes problem without primal pressure unknowns, *An invited talk to Colloquium, Department of Mathematics*, October 22, 2010, The Chinese University of Hong Kong, Hong Kong.

A FETI-DP algorithm for the Stokes problem without coarse pressure components, *An invited talk to Fast Algorithms for Scientific Computing: A symposium in Honor of Olof B. Widlund*, September 19-20, 2008, New York, USA.

Domain Decomposition Algorithms for mortar discretization, *An invited speaker to the 17th International Conference on Domain Decomposition Methods*, July 2006, Strobl, Austria.

Domain Decomposition Algorithms for mortar discretization, *In Numerical Analysis Seminar, Courant Institute*, April 2006, New York, USA.

BDDC and FETI-DP algorithms for mortar finite element methods, *In SIAM Conference on Parallel Processing for Scientific Computing*, February 2006, San Francisco.

A FETI-DP formulation for the three dimensional elasticity problem with mortar methods, *In the 16th International Domain Decomposition Conference*, January 2005, New York.

A FETI-DP formulation for Two-dimensional Stokes problem on nonmatching grids, *In the 15th International Domain Decomposition Conference*, July 2003, Berlin.

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