

# Donghwan Kim

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CONTACT INFORMATION	E2-1 3205, 291 Daehak-ro Yuseong-gu, Daejeon 34141 Rep. of Korea	<i>Phone:</i> +82-42-350-2717 <i>E-mail:</i> donghwankim@kaist.ac.kr <i>WWW:</i> <a href="http://mathsci.kaist.ac.kr/~donghwankim">http://mathsci.kaist.ac.kr/~donghwankim</a>
RESEARCH INTERESTS	<b>Continuous Optimization, Convex Optimization, Applications of Optimization Methods</b>	
ACADEMIC APPOINTMENT	<b>KAIST</b> , Daejeon, Republic of Korea <i>Assistant Professor</i> of Mathematical Sciences Dept.	Aug. 2018 - present
EDUCATION	<b>University of Michigan</b> , Ann Arbor, MI USA Ph.D., Electrical Engineering: Systems • Thesis: Accelerated optimization algorithms for statistical 3-D X-ray CT image reconstruction • Advisor: Prof. Jeffrey A. Fessler M.S.E., Electrical Engineering: Systems <b>Seoul National University</b> , Seoul, Republic of Korea B.S., Electrical Engineering	Aug. 2014 May 2011 Feb. 2009
ACADEMIC EXPERIENCE	<b>Dartmouth College</b> , Hanover, NH USA <i>Research Instructor</i> of Math Dept. • Advisor: Prof. Anne Gelb <b>Harvard University</b> , Cambridge, MA USA <i>Postdoctoral Research Fellow</i> of SEAS • Advisor: Prof. Demba Ba <b>University of Michigan</b> , Ann Arbor, MI USA <i>Postdoctoral Research Fellow</i> of EECS Dept. <i>Graduate Student Research Assistant</i> of EECS Dept. • Advisor: Prof. Jeffrey A. Fessler	Jul. 2017 - Jul. 2018 Sep. 2015 - Mar. 2016 Jun. 2014 - Aug. 2015, Jun. 2016 - Jun. 2017 Jan. 2010 - May 2014
PREPRINTS/ SUBMITTED PAPERS	1. <b>D. Kim</b> , "Accelerated proximal point method for maximally monotone operators," [arXiv e-print 1905.05149].	
JOURNAL PAPERS	9. <b>D. Kim</b> and J. A. Fessler, "Optimizing the efficiency of first-order methods for decreasing the gradient of smooth convex functions," <i>J. Optim. Theory Appl.</i> , 2020. [arXiv e-print 1803.06600]. 8. K. Kim, <b>D. Kim</b> , J. Yang, G. El Fakhri, Y. Seo, J. A. Fessler and Q. Li, "Time of flight PET reconstruction using non-uniform update for regional recovery uniformity," <i>Med. Phys.</i> , vol. 46, no. 2, pp. 649-64, Feb. 2019. 7. <b>D. Kim</b> and J. A. Fessler, "Adaptive restart of the optimized gradient method for convex optimization," <i>J. Optim. Theory Appl.</i> , vol. 178, no. 1, pp. 240-63, Jul. 2018. [arXiv e-print 1703.04641]. 6. <b>D. Kim</b> and J. A. Fessler, "Generalizing the optimized gradient method for smooth convex minimization," <i>SIAM J. Optim.</i> , vol. 28, no. 2, pp. 1920-50, 2018. [arXiv e-print 1607.06764].	

5. **D. Kim** and J. A. Fessler, "Another look at the fast iterative shrinkage/thresholding algorithm (FISTA)," *SIAM J. Optim.*, vol. 28, no. 1, pp. 223-50, 2018. [arXiv e-print 1608.03861]
4. **D. Kim** and J. A. Fessler, "On the convergence analysis of the optimized gradient method," *J. Optim. Theory Appl.*, vol. 172, no. 1, pp. 187-205, Jan. 2017. [arXiv e-print 1510.08573]
3. **D. Kim** and J. A. Fessler, "Optimized first-order methods for smooth convex minimization," *Mathematical Programming, Series A*, vol. 159, no. 1, pp. 81-107, Sep. 2016. [arXiv e-print 1406.5468]
2. **D. Kim**, S. Ramani, and J. A. Fessler, "Combining ordered subsets and momentum methods for accelerated X-ray CT image reconstruction," *IEEE Trans. Med. Imag.*, vol. 34, no. 1, pp. 167-78, Jan. 2015.
1. **D. Kim**, D. Pal, J.-B. Thibault, and J. A. Fessler, "Accelerating ordered subsets image reconstruction for X-ray CT using spatially nonuniform optimization transfer," *IEEE Trans. Med. Imag.*, vol. 32, no. 11, pp. 1965-78, Nov. 2013.

TECHNICAL  
REPORTS

1. **D. Kim** and J. A. Fessler, "Fast dual proximal gradient algorithms with rate  $O(1/k^{1.5})$  for convex minimization," [arXiv e-print 1609.09441].

CONFERENCE  
PROCEEDING  
PAPERS

11. **D. Kim** and J. A. Fessler, "Accelerated dual gradient-based methods for total variation image denoising/deblurring problems," *IEEE Conf. Acoust. Speech Sig. Proc.*, pp. 6230-4, 2017.
10. **D. Kim** and J. A. Fessler, "An optimized first-order method for image restoration," *Proc. IEEE Intl. Conf. on Image Processing.*, pp. 3675-9, 2015.  
★ **Received top 10% paper recognition**
9. **D. Kim** and J. A. Fessler, "Distributed block-separable ordered subsets for helical X-ray CT image reconstruction," *Proc. Intl. Mtg. on Fully 3D image Recon. in Rad. and Nuc. Med.*, pp. 138-41, 2015.
8. **D. Kim** and J. A. Fessler, "Optimized momentum steps for accelerating X-ray CT ordered subsets image reconstruction," *Proc. Third Intl. Mtg. on image formation in X-ray computed tomography*, pp. 103-6, 2014.
7. **D. Kim** and J. A. Fessler, "Ordered subsets acceleration with relaxed momentum for X-ray CT image reconstruction," *Proc. IEEE Nuc. Sci. Symp. Med. Im. Conf.*, 2013.  
★ **Student paper competition finalist**
6. **D. Kim**, S. Ramani, and J. A. Fessler, "Accelerating X-ray CT ordered subsets image reconstruction with Nesterov's first-order methods," *Proc. Intl. Mtg. on Fully 3D image Recon. in Rad. and Nuc. Med.*, pp. 22-5, 2013.
5. **D. Kim**, S. Ramani, and J. A. Fessler, "Ordered subsets with momentum for accelerated X-ray CT image reconstruction," *Proc. IEEE Conf. Acoust. Speech Sig. Proc.*, pp. 920-3, 2013.
4. **D. Kim**, D. Pal, J.-B. Thibault, and J. A. Fessler, "Improved ordered subsets algorithm for 3D X-ray CT image reconstruction," *Proc. Second Intl. Mtg. on image formation in X-ray computed tomography*, pp. 378-81, 2012.
3. **D. Kim** and J. A. Fessler, "Parallelizable algorithms for X-ray CT image reconstruction with spatially non-uniform updates," *Proc. Second Intl. Mtg. on image formation in X-ray computed tomography*, pp. 33-7, 2012.
2. J. A. Fessler and **D. Kim**, "Axial block coordinate descent (ABCD) algorithm for X-ray CT image reconstruction," *Proc. Intl. Mtg. on Fully 3D image Recon. in Rad. and Nuc. Med.*, pp. 262-5, 2011.
1. **D. Kim** and J. A. Fessler, "Accelerated ordered-subsets algorithm based on separable quadratic surrogates for regularized image reconstruction in X-ray CT," *Proc. IEEE Intl. Symp. Biomed. Imag.*, pp. 1132-7, 2011.

PATENTS AND  
DISCLOSURES

3. *U.S. Patent* No. 9,721,361, D. Pal, E. Drapkin, J.-B. Thibault, S. Srivastava, R. Thome, M. McGaffin, J. A. Fessler, **D. Kim**, “Systems and methods for parallel processing of imaging information.”
2. *U.S. Patent* No. 9,489,752, **D. Kim**, S. Ramani, J. A. Fessler, L. Fu, and B. K. B. De Man, “Ordered subsets with momentum for X-ray CT image reconstruction.”  
★ **Licensed to a medical imaging vendor**
1. *U.S. Patent* No. 8,958,660, D. Pal, **D. Kim**, J. H. Cho, J. A. Fessler, J.-B. Thibault, Z. Yu, S. Srivastava, L. Fu, and B. K. B. De Man, “Method and apparatus for iterative reconstruction.”

HONORS AND  
AWARDS

TJ Park Young Professor Fellowship, POSCO TJ Park Foundation,	2020 - 2021
Top 10% Paper Recognition, IEEE Intl. Conf. on Image Processing,	2015
Finalist, Student Paper Competition, IEEE Nuc. Sci. Symp. Med. Im. Conf.	2013
Conference Trainee Grant, IEEE Nuc. Sci. Symp. Med. Im. Conf.	2013
Student Travel Award, Intl. Mtg on Fully 3D image Recon. in Rad. and Nuc. Med.	2013
Rackham Travel Grant, University of Michigan	2011, 2012, 2013
KLA-Tencor Graduate Fellowship, KLA-Tencor Corporation	2010
National Science and Technology Scholarship, Korea Science and Engineering Foundation	2004

INVITED/  
CONTRIBUTED  
TALKS

- “First-order methods and their acceleration for large-scale optimization”
  - Hanoi National University of Education (HNUE), VIASM-HUS-HNUE-KAIST Joint Mathematical Meeting, Vietnam, 2019.
- “Accelerated Douglas-Rachford operator splitting method for variational problems”
  - Korean SIAM (KSIAM) Annual Meeting, Korea, 2019.
- “Accelerated gradient method for convex-concave saddle-point problems”
  - Korean Mathematical Society (KMS) Annual Meeting, Korea, 2019.
- “Iterative methods for continuous optimization”
  - Tutorial, The AI Korea, Korea, 2019.
- “Accelerated proximal point method for maximally monotone operators”
  - Int’l Conf. on Continuous Optimization (ICCOPT), Germany, 2019.
  - Int’l Conf. on Matrix Theory and Appl. (ICMTA), Korea, 2019.
- “Accelerated proximal point method for maximally monotone operators with applications to ADMM for inverse problems”
  - KSIAM Spring Conference, Korea, 2018.
- “Accelerated first-order methods for large-scale optimization”
  - KAIST-POSTECH Math-AI workshop, 2019.
  - The AI Korea, Korea, 2019.
  - Comp. Sci. Colloquium, Korea Institute for Advanced Study (KIAS), Korea, 2019.
  - KMS Spring Meeting, Korea, 2019.
  - Math. Dept. Colloquium, KAIST, Korea, 2019.
  - Applied Math. and Stat. Dept. Colloquium, SUNY Korea, Korea, 2019.
  - KAIST-Inria Applied Math. Workshop, France, 2019.
  - Stat. Dept. Seminar, Seoul National University, Korea, 2019.

- “First-order methods for optimization-based inverse problems”
  - Inverse Problem Workshop, National Institute for Mathematical Sciences (NIMS), Korea, 2018.
- “First-order methods for optimization-based image reconstruction”
  - Advanced Nuclear Medicine Physics course, Dept. of Biomedical Sciences, Seoul National University, Korea, 2018.
- “Continuous optimization and its application to machine learning”
  - Undergrad. Math. Colloquium, KAIST, Korea, 2018.
- “Optimized first-order method for decreasing gradient of smooth convex functions”
  - KSIAM Annual Meeting, Korea, 2018.
  - Int’l Symposium on Mathematical Programming (ISMP), France, 2018.
- “Optimizing the efficiency of the first-order methods for convex optimization.”
  - Math. Dept., KAIST, Korea, 2018.
  - Appl. and Comp. Math. Seminar, Dartmouth College, USA, 2018.
- “Accelerated gradient methods for large-scale convex optimization.”
  - Math. Dept. Colloquium, Ewha University, Korea, 2018.
  - GSCST, Seoul National University, Korea, 2018.
  - ECE Dept., UNIST, Korea, 2018.
  - CSE Dept., Yonsei University, Korea, 2018.
  - Appl. Algebra and Optim. Research Center (AORC), Sungkyunkwan University, Korea, 2018.
  - Math. Dept., Seoul National University, Korea, 2018.
  - Math. Dept., KAIST, Korea, 2018.
  - Appl. and Comp. Math. Seminar, Dartmouth College, USA, 2018.
- “Improving the optimized gradient method for large-scale convex optimization,”
  - SIAM Conference on Optimization, Canada, 2017.
- “Optimized gradient method for smooth convex minimization.”
  - Appl. and Comp. Math. Seminar, Dartmouth College, USA, 2017.
  - IBM T. J. Watson Research Center, USA, 2017.
  - Mitsubishi Electric Research Laboratories (MERL), USA, 2016.
  - Int’l Symposium on Mathematical Programming (ISMP), USA, 2015.
- “Optimized gradient methods for accelerated statistical 3D X-ray CT image reconstruction.”
  - SEAS, Harvard University, USA, 2015.
- “Accelerated ordered subsets algorithms for model-based 3-D X-ray CT image reconstruction.”
  - BME Dept., Johns Hopkins University, USA, 2014.
- “Accelerated optimization algorithms for statistical 3-D X-ray CT image reconstruction.”
  - Lab Seminar, Dept. of Biomedical Sciences, Seoul National University, Korea, 2014.
  - ECE Dept., UNIST, Korea, 2014.
  - Media IT Engineering Program, SeoulTech, Korea, 2014.
  - Medical Imaging Seminar, KAIST, Korea, 2013.

EDITORIAL  
POSITIONS

Associate Editor, Numerical Algebra, Control and Optimization

2021

JOURNAL  
REVIEWS

Bulletin of the Korean Mathematical Society, IEEE Signal Processing Letters, IEEE Transactions on Biomedical Engineering, IEEE Transactions on Computational Imaging, IEEE Transactions on Image Processing, IEEE Transactions on Medical Imaging, IEEE Transactions on Neural Networks and Learning Systems, International Journal of Computer Assisted Radiology and Surgery, Journal of Optimization Theory and Applications, Journal of Scientific Computing, Journal of X-ray Science

and Technology, Mathematical Programming, Medical Physics, Nuclear Instruments and Methods in Physics Research A, Optimization and Engineering, Pure and Applied Functional Analysis, Sensors, SIAM Journal on Imaging Sciences, SIAM Journal on Optimization, SIAM Journal on Scientific Computing

CONFERENCE REVIEWS Cairo International Biomedical Engineering Conference (CIBEC), Intl. Conf. on Learning Representations (ICLR), Intl. Conf. on Machine Learning (ICML), Intl. Conf. on Signal Processing and Communications (SPCOM)

CURRENT STUDENTS • Dong Chul Kim (M.S. Jan. 2019 - Aug. 2020, Ph.D. Sep. 2020 -)  
• Sucheol Lee (Ph.D. Nov. 2019 -)  
• Hyeokjoo Park (Ph.D. Mar. 2020 -)  
• Donghyun Kim (M.S.-Ph.D. Sep. 2020 -)

PAST STUDENTS • Hyeonmin Lee (M.S. Jan. 2019 - Feb. 2021)  
• Euntaek Shin (M.S. Jul. 2019 - Feb. 2021)

TEACHING EXPERIENCE **KAIST**, Daejeon, Republic of Korea  
• MAS 101 Calculus I (Spring 2021)  
• MAS 109 Introduction to Linear Algebra (Fall 2018, Fall 2020)  
• MAS 365 Introduction to Numerical Analysis (Spring 2019, Spring 2020, Spring 2021)  
• MAS 374 Optimization Theory (Fall 2019)

**Dartmouth College**, Hanover, NH USA  
• MATH 126 Current Problems in Applied Mathematics: Convex Optimization (Winter 2018)

PROFESSIONAL EXPERIENCE **GE Healthcare**, Waukesha, WI USA  
*PhD internship* **May 2011 - Aug. 2011**

**LIG Nex1 Co., Ltd. Yongin R&D Center**, Yongin, Republic of Korea  
*Summer internship* **Jul. 2006 - Aug. 2006**

COMPUTER SKILLS • Languages: C/C++, Matlab, Python  
• Applications:  $\LaTeX$ , common Windows database, spreadsheet, and presentation software

SERVICE Committee, KSIAM MathWorks Challenge 2019  
Vice President, Korean Student Association - Graduate, University of Michigan 2014  
President, Korean EECS Student Association, University of Michigan 2013

REFERENCES Available upon request.