

Curriculum vitae

Personal

Name in Full Min-Cheol, Kim (Male)
Date of Birth May 20, 1974
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 Department of Mechanical Engineering (ME)
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Academic Education

MSc. & Ph.D. School of Mechanical & Aerospace Engineering, Seoul National University, Seoul, Korea.
3/2000 - 2/2005 *Major: Computational fluid mechanics and biological cell dynamics, Advisor: Prof. Charn-Jung Kim*

BSc. Department of Mathematics, The University of Seoul, Seoul, Korea.
3/1993 – 2/1995 *Interested field: ODE & PDE, Multivariable Analysis*
3/1997 – 2/2000

Theses

Ph.D. *Numerical Analysis of Nanoparticle Dynamics for Biomedical Applications*, Seoul National University
2005

Theses Supervising and Teaching Experience

Sang-II Lee *A Study for Identification of Critical Design Factor of DRES-Ball and for Efficient Cooling of Exhaust Gas by Water Spray in terms of Numerical Analysis*, Master Thesis (2006)

Jik Han Jeong *Numerical analysis of Particle Hemodynamics on Bypassed and Bifurcated geometry of Abdominal and Iliac Arteries*, Master Thesis (2005)

Hanyoung Kang *Numerical Study on the Blood Flow in the Abdominal Artery with Real Geometry*, Master Thesis (2003)

 TA *Heat Transfer, Seoul National University (2001 Spring and Fall)*
 TA *Engineering Mathematics, Seoul National University (2000 Spring and Fall)*
 Lecturer *Fluid Mechanics I, University of Incheon (2005 Fall)*

Grant Projects

7/2001 – 3/2005 Measurement and Analysis of Microscale Thermophysical Properties, Korea Engineering and Science Foundation

- 7/2002 - 4/2004 Program Development for Simulation Based Arterial Surgery Planning, Korea Ministry of health and welfare
- 6/2006 – 5/2007 A Study on the Modeling and Design of Microfluidic Devices for Biomedical Applications, Korea Research Foundation (*progress with Prof. Todd Thorsen*)

Work Experiences

- 6/2007 – Present *Postdoctoral Associate*, Department of Mechanical Engineering, Massachusetts Institute of Technology, MA, USA *Advisor: Prof. Todd Thorsen*
- 6/2006 – 5/2007 *Postdoctoral Fellow*, Department of Mechanical Engineering, Massachusetts Institute of Technology, MA, USA *Advisor: Prof. Todd Thorsen*
- 4/2005 – 3/2006 *Postdoctoral Researcher*, BK21 Mechanical Division, Seoul National University, Seoul, Korea *Advisor: Prof. Charn-Jung Kim*
- 7/2001 – 3/2005 *Assistant Researcher*, Micro Thermal System Research Center, School of Mechanical and Aerospace Engineering, Seoul National University, Seoul, Korea
- 6/2002 – 8/2002 *Visiting Researcher*, Department of Materials Science and Engineering, Royal Institute of Technology, Stockholm, Sweden. *Advisor: Prof. Mamoun Muhammed*
- 1/2002 – 3/2002 *Visiting Researcher*, Department of Materials Science and Engineering, Royal Institute of Technology, Stockholm, Sweden. *Advisor: Prof. Mamoun Muhammed*
- 3/2000 – 2/2005 *Teaching Assistant and Research Assistant*, Brain Korea 21, School of Mechanical and Aerospace Engineering, Seoul National University, Seoul, Korea
- 2/1995 - 4/1997 *Military Service*

Research Experiences

1. Doctoral dissertation (Seoul National University)

- Comparison of flow conditions between stenosed coronary and abdominal arteries. (*with Prof. C.S. Lee at Hangdong University*)
- Code development for the tracking of micro-sized blood particle in the artery. (*with Prof. C.S. Lee at Hangdong University*)
- Validation Studies of novel hemodynamic wall parameter (NWDP; near-wall deposition probability) based on particle-wall interaction and related to development of arterial disease. (*with Prof. C. S Lee at Hangdong University and Dr. J.H. Nam at Seoul National University*)
- Simulation based on arterial surgery planning to left circumflex (LCX) coronary artery. (*with Prof. Lee at Hangdong University, Prof. M. Sonka and Prof. K.B Chandran at The University of Iowa*)
- Tracking of superparamagnetic iron oxide nanoparticle (SPION) movement in a capillary by numerical modeling. (*with Prof. D.-K. Kim at Keele University, UK and Prof. M. Muhammed at Royal Institute of Technology, Stockholm, Sweden*)
- Drug delivery system (DDS) with biodegradable polymers as a Korean government project. (*with Mr. Y.S. Jo at EPFL, Switzerland, Prof. D.-K. Kim at Keele University, UK and Dr. Y.K. Jeong at KICET, Korea, Prof. Mamoun Muhammed at Royal Institute of Technology, Stockholm, Sweden*)

2. Post doctor (Seoul National University)

- Numerical simulation of targeted drug delivery using superparamagnetic Iron Oxide Nanoparticles in Pulsatile Microcirculation under an External Magnetic Field. (*with Prof. D.-K. Kim at Keele University and Dr. S.H. Lee & Mr. Amin at Massachusetts Institute of Technology*)
- Tracking of platelets in the realistic bifurcated & C-inverted bypassed abdominal models. (*with Mr. J.H. Jeong at Seoul National University*)
- Code development for the tracking of bio-particle in microfluidic system. (*with Mr. D.K. Im at Function Bay company; interface with MFC*)

3. Post doctor (Massachusetts Institute of Technology; Prof. Todd Thorsen group)

- Code development of computational fluid dynamics (CFD) based on FVM (finite volume method) in steady electroosmotic flow.
- High-Density Microfluidic Arrays for Cell Cytotoxicity Analysis. (with Dr. Z. Wang and Prof. T. Thorsen at Massachusetts Institute of Technology)
- Numerical Analysis on Diffusion of dissolved Oxygen in the Biological Cell culturing microfluidic device. (with Mr. Lam at Massachusetts Institute of Technology)
- Numerical modeling on nanofiber microfluidic device using hydrodynamic focus.
- Program written in C++ (Microsoft), which we refer to as 'Lab-Chip-Designer' (LCD), was developed to model the Lagrangian cell dynamics flowing through the simulated the microfluidic device.
- Numerical modeling on peristaltic pump in the microfluidic device using moving boundary approach.

Technical Skills

- Programming Languages; Mathematica(*), MATLAB, C++(*), FORTRAN
- Commercial CFD tool; STAR-CD 3.24a(*), Fluent 6.0, ANSYS CFX 10(*), Tecplot 10.0(*), ICEM CFD, FEMLAB 3.1, PRO-AM (*auto-meshing tool)
- Own Code; 'Lab-Chip-Designer' (LCD) (*), Solver for steady electroosmotic flow(*)
- One time training & experience: AFM, TEM, SEM, FTIR
- Soft-lithography microfluidic fabrication experience (high-resolution printing output, vacuum-mixers, spin-coaters, UV curing and bonding facility plus micro-manipulators, capillary pumps and ancillary handling equipment), Long-working range stereoscope (Olympus SZX9)

*: very skillful

Publications

1. Mathematical Modeling on Diffusion of Oxygen in the Microfluidic Oxygenator, **Min-Cheol Kim**, Raymond H. W. Lam and Todd Thorsen, (2007), in preparation.
2. A Self-contained Microfluidic Cell Culture Array Platform, Zhanhui Wang, **Min-Cheol Kim**, Manuel Marquez, and Todd Thorsen, *BioTechniques*, (2007), submitted.
3. Building a Better Cell Trap: Applying Lagrangian Modeling to the Design of Microfluidic Devices for Cell Biology, **Min-Cheol Kim**, Zhanhui Wang, Raymond H. W. Lam and Todd Thorsen, *Journal of Applied Physics*, (2007), submitted.
4. * High-Density Microfluidic Arrays for Cell Cytotoxicity Analysis, Zhanhui Wang, **Min-Cheol Kim**, Manuel Marquez, and Todd Thorsen, *Lab on a chip*, 7 (6) (2007) 740-745.
5. * Near-wall deposition probability of blood elements as a new hemodynamic wall parameter, **Min-Cheol Kim**, Jin Hyun Nam, Chong-Sun Lee, *Annals of Biomedical Engineering*, 34(6) (2006) 958-970.
6. Dynamic characteristics of superparamagnetic Iron Oxide Nanoparticles in a Viscous fluid under an External Magnetic Field, **Min-Cheol Kim**, Do-Kyung Kim, Se-Hee Lee, M.Shahrooz Amin, Il-Han Park, Charn-Jung Kim, and Markus Zahn, *IEEE TRANSACTIONS ON MAGNETICS*, 42(4) (2006) 979-982.
7. Blood Flow Simulation in Bifurcated Geometry of Abdominal and Iliac Arteries Based on CT Images, Y.S. Hong, **M.C. Kim**, H.M. Kang, C.S. Lee, C.J. Kim, J.M. Lee, D.S. Kim, K. Lee, *J. Biomed. Eng. Res.*, 25(6) (2004) 431-437 (Korean).
8. In-vitro test and mathematical modeling on the controlled-release behavior of indomethacin from PLA-PEO nanospheres, Y. S. Jo, **M.C. Kim**, D. K. Kim, C. J. Kim, Y. K. Jeong, K. J. Kim, M. Muhammed, *Annals of Transplantation*, 9 (2004) 96-100.

9. * Mathematical modeling and in-vitro experiment for the controlled-release of indomethacin-loaded PLA-PEO nanospheres, Yun-Suk Jo, **Min-Cheol Kim**, Do Kyung Kim, Charn-Jung Kim, Young-Keun Jeong, Kyung-Ja Kim, and Mamoun Muhammed, *Nanotechnology*, 15 (2004) 1186-1194.
10. Influence of Cardiac Contraction and its Phase Angle with coronary Blood flow on Atherosclerosis of Coronary Artery, **Min-Cheol Kim**, Chon-Sun Lee, Charn-Jung Kim, Hyuck Moon Kwon, *J. Biomed. Eng. Res.*, 23(6) (2002) 437-449 (Korean).
11. Hemodynamic effects on atherosclerosis-prone coronary artery: wall shear stress/ rate distribution and impedance phase angle in coronary and aortic circulation, B.K. Lee, H.M. Kwon, B.K. Hong, B.E. Park, S.H Suh, M.T. Cho, C.S. Lee, **M.C. Kim**, C.J. Kim, S.S. Yoo, H.S. Kim, *Yonsei Medical Journal*, 42 (2001) 375-383.

*:attachment with three most significant papers

Conference Presentations

1. A MICROFLUIDIC OXYGENATOR FOR BIOLOGICAL CELL CULTURE, Raymond H. W. Lam, **Min-Cheol Kim**, and Todd Thorsen, *TRANSDUCERS '07*, pp 2489-2492, June. 10-14., 2007, Lyon, France.
2. Simulation on biological cell transport in the microfluidic device, **Min-Cheol Kim**, Zhanhui Wang, Raymond H. W. Lam, and Todd Thorsen, *Nanotech 2007*, May. 20-24., 2007, Santa clara, California.
3. A Micro Array with Micro Cell Sieves for Cell Cytotoxicity Screeing, Zhanhui Wang, **Min-Cheol Kim**, Manuel Marquez, and Todd Thorsen, *Nanotech 2007*, May. 20-24., 2007, Santa clara, California..
4. A Microfluidic Array with Micro Cell Sieves for Cell Cytotoxicity Screening, Zhanhui Wang, **Min-Cheol Kim**, Manuel Marquez, and Todd Thorsen, *2007 MRS Spring Meeting*, April. 10-12., 2007, San Francisco, California.
5. Particle Hemodynamics on the bypassed and Bifurcated geometry of Abdominal and Iliac Arteries, **Min-Cheol Kim**, Chong-Sun Lee, Charn-Jung Kim, *WC 2006 (World Congress on Medical Physics and Biomedical Engineering 2006)*, Aigt. 27-Sep. 1, 2006, Seoul, Korea.
6. Dynamic charateristics of superparamgnetic Iron Oxide Nanoparticles in a Viscous fluid under an External Magnetic Field, Se-Hee Lee, Do-Kyung Kim, **Min-Cheol Kim**, M.Shahrooz Amin,Il-Han Park, Charn-Jung Kim, and Markus Zahn, *COMPUMAG2005*, Shenyang, China, Jun 26-3, 2005. Also published in *IEEE TRANSACTIONS ON MAGNETICS*.
7. Near-wall Deposition Probability of Blood Particles in Reconstructed Left Circumflex Coronary Artery, **M.C. Kim**, C.S. Lee, C.J. Kim, M. Sonka, K.B. Chandran, *The 6th KSME-JSME Thermal Fluid Engineering Conference*, Jeju, Korea, 20-23, March, 2005.
8. Analysis of volumetric residence time of blood elements in stenosed arteries, **M.C. Kim**, C.S. Lee, C.J. Kim, *2003 ASME International Mechanical Engineering Congress & Exposition*, Washington D.C., 16-21, Nov., 2003.
9. Numerical Study on the Blood Flow in the Abdominal Artery with Real Geometry, H.Y. Kang, **M.C. Kim**, Y.S. Hong, C.S. Lee, J.M. Lee, C.-J. Kim, *Proceedings of the KSME annual fall conference*, Muju Resort, Korea, 5-7, Nov., 2003 (Korean).

10. In-vitro test and mathematical modeling on the controlled-release behavior of indomethacin from PLA-PEO nanospheres, Y.S. Jo, **M.C. Kim**, D.K. Kim, C.J. Kim, Y.K. Jeong, K.J. Kim, M. Muhammed, *2003 E MRS Fall Meeting, Warsaw University of Technology, Warsaw, Poland, 15-19, September, 2003.*
11. Analysis of volumetric residence time of blood elements in stenosed coronary artery, **M.C. Kim**, C.S. Lee, C.J. Kim, *The 2nd Annual Conference of Korea Biomedical Engineering Society for circulatory Disorders, Seoul, Korea, Nov. 28, 2002.*
12. Comparison of wall shear stress distribution between stenosed coronary, abdominal and femoral arteries, **M.C. Kim**, C.S. Lee, C.J. Kim, *The 5th JSME-KSME Fluid Engineering Conference, Nagoya, Japan, Nov. 17-21, 2002.*
13. Modeling of the transport of superparamagnetic magnetite nanoparticles in biological fluids, M. Mikhaylova, **M.C. Kim**, M. Toprak, D.K. Kim, C.J. Kim and M. Muhammed, *Nano 2002; 6th International Conference on Nanostructured Materials, Orlando, Florida, USA, Jun. 16-21, 2002.*
14. Modeling of drug release in biodegradable magnetic nanospheres, D.K. Kim, **M.C. Kim**, A. Guyou, M. Mikhaylova, M. Toprak, C.J. Kim and M. Muhammed, *Nano 2002; 6th International Conference on Nanostructured Materials, Orlando, Florida, USA, Jun. 16-21, 2002.*
15. Flow comparison between Stenosed Coronary and Abdominal Arteries, **M.C. Kim**, C.S. Lee and C.J. Kim *Proceedings of the KSME annual fall conference, Jeonbuk National Univ., Korea, 1-3, Nov., 2001 (Korean).*

Names of two referees

1. Prof. Todd Thorsen (current supervisor)
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2. Prof. Chong-Sun Lee (Ph.D. co-supervisor)
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