

Kwang Hee Ko

Design and Manufacturing Institute
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Research Fields CAD/CAM/CAE, Geometric Modeling, Solid Modeling, Physics Based Modeling, Advanced Manufacturing, Simulation, Complexity of System, Real Time Command and Control.

Teaching Interests Computational Geometry, CAD/CAM, Software Engineering, Structural Mechanics, Vibration, FEM, Modeling and Simulation.

Professional Experiences

- Design and Manufacturing Institute** (9/2004 - Present) Hoboken, NJ
 - Knowledge Engineer (Research Associate).
 - Director : Professor Kishore Pochiraju.
- Massachusetts Institute of Technology** (9/2004 - Present) Cambridge, MA
 - Research Affiliate at Design Laboratory.
 - Director : Professor N. M. Patrikalakis.
- Massachusetts Institute of Technology** (6/2003 - 8/2004) Cambridge, MA
 - Postdoctoral Associate.
 - Advisor : Professor N. M. Patrikalakis.
- Massachusetts Institute of Technology** (9/1999 - 5/2003) Cambridge, MA
 - Research and Teaching Assistant.
- SAMSUNG Heavy Industries, Shipbuilding Division** (2.1995-3.1997) Koje, Korea
 - Worked as a design engineer in the Basic Design Department.
 - Completed the initial design of a 105KT crude oil tanker and a 73KT bulk carrier.

Education **Massachusetts Institute of Technology** Cambridge, MA

- Ph.D in Computer Aided Design and Manufacturing.
June 2003. Focus on CAD/CAM/CAE.
- Advisors : Professor N. M. Patrikalakis and Professor T. Maekawa.
- Thesis : [Algorithms for Three-Dimensional Free-Form Object Matching](#).

Kwang Hee Ko

Massachusetts Institute of Technology Cambridge, MA

- Master of Science in Mechanical Engineering, 2001.
- Master of Science in Naval Architecture and Marine Engineering, 2001.
- Advisors : Professor N. M. Patrikalakis and Professor T. Maekawa.
- Thesis : Laser Measurement and Reconstruction of Curved Plates.

Seoul National University Seoul, Korea

- Bachelor of Science in Naval Architecture and Ocean Engineering, 1995.
- Graduated *Magna Cum Laude*.

Awards Bongshin Scholarship (1994-1995). Seoul, Korea

Research Experience **Design and Manufacturing Institute** (9/2004 - Present) Hoboken, NJ

- Collaborator : Professor Kishore Pochiraju.
- Currently developing XML based system integration and evaluation tools in a distributed computing environment. Developing complexity measures for complex system design and analysis. Developing real-time control system.

MIT Design Laboratory (2/2001 - 8/2004) Cambridge, MA

- Advisors : Professor N. M. Patrikalakis and Professor T. Maekawa.
- Developed methods for 3D free-form object matching and similarity assessment, and applied them to shape intrinsic watermarks for copyright protection.

MIT Design Laboratory (12/2002 - Present) Cambridge, MA

- Advisors : Professor N. M. Patrikalakis and Professor T. Sakkalis.
- Currently developing robust and efficient methods for calculating intersections between two surfaces. My research includes investigation of intersection algorithms based on interval arithmetic, reduction of error bounds in the solution, and accurate and robust calculation of starting points for tracing intersection curves.

MIT Design Laboratory (9/1998 - 6/2001) Cambridge, MA

- Advisors : Professor N. M. Patrikalakis and Professor T. Maekawa.
- Developed a system which measures an object with a 3D laser scanner and constructs a CAD surface for inspection purposes. The system consists of three independent machines: a 3D laser scanner, a robot arm and a processing computer, which are interconnected through the Internet. It measures an object (usually a curved metal plate) automatically and generates a NURBS surface for inspection.

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**Computerized and Automated Ship Production
Engineering Research (CASPER) Laboratory,
Seoul National University** Seoul, Korea
(8/1997 - 3/1998)

- Advisor : Professor J. K. Shin.
- Developed an automated system for curved plate production using line heating. Algorithms were developed for communication between a torch machine and a heating path generation program, and for fine control of the torch position.

Teaching Experience

Massachusetts Institute of Technology (1/2004) Cambridge, MA

- *Introduction to Effective C++ Programming.*
- Taught a week long advanced computer programming course during the Independent Activities Period (IAP).

Massachusetts Institute of Technology (9/2003 - 12/2003) Cambridge, MA

- 13.10J *Structural Mechanics*, High Level Graduate Course. Instructor.
- Gave several lectures.
- Created problem sets and exams. Helped students during recitation with problem sets or materials that they found difficult to understand.

Massachusetts Institute of Technology (2/2003 - 5/2003) Cambridge, MA

- 13.472J *Computational Geometry*, High Level Graduate Course. Instructor/TA.
- Gave nine lectures (out of 26 lectures).
- Created and graded problem sets.

Massachusetts Institute of Technology Cambridge, MA
(9/1999-12/1999, 9/2000-12/2000)

- 13.10J *Structural Mechanics*, High Level Graduate Course. Teaching Assistant.
- Created problem sets and exams. Helped students during recitation with problem sets or materials that they found difficult to understand.

Publications

Journals

- **Algorithms for Optimal Partial Matching of Free-Form Objects with Scaling Effects**
by **K. H. Ko**, T. Maekawa and N. M. Patrikalakis *Graphical Models*.
Vol. 67, No. 2, pp. 120-148, March 2005.
- **Surface to Surface Intersections**
by N. M. Patrikalakis, T. Maekawa, **K. H. Ko**, and H. Mukundan.
Computer-Aided Design and Applications.
Vol. 1, No. 1-4, pp. 449-458, 2004.

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- **Shape Intrinsic Properties for Free-Form Object Matching**
by **K. H. Ko**, T. Maekawa, N. M. Patrikalakis, H. Masuda, and F.-E. Wolter.
ASME Transactions, Journal of Computing and Information Science in Engineering.
Vol. 3, No. 4, pp. 325-333, December 2003.
- **An Algorithm for Optimal Free-Form Object Matching**
by **K. H. Ko**, T. Maekawa and N. M. Patrikalakis. *Computer Aided Design*.
Vol. 35, No. 10, pp. 913-923, September 2003.
- **Surface Construction by Fitting Unorganized Curves**
by T. Maekawa and **K. H. Ko**. *Graphical Models*.
Vol. 64, No. 5, pp. 316-332, September 2002.

Refereed Conferences

- **Nonlinear Polynomial Systems: Multiple Roots and their Multiplicities**
by **K. H. Ko**, T. Sakkalis, N. M. Patrikalakis.
Shape Modeling International Conference, 2004. F. Giannini and A. Pasko, editors.
pp. 87-98, Genova, Italy, Los Alamitos, CA: IEEE Computer Society Press, 2004.
- **Tracing Surface Intersections with a Validated ODE System Solver**
by H. Mukundan, **K. H. Ko**, T. Maekawa, T. Sakkalis, and N. M. Patrikalakis
Proceedings of the 9th EG/ACM Symposium on Solid Modeling and Applications
G. Elber and G. Taubin, editors. pp. 249-254, Genoa, Italy, June 2004.
Eurographics Press. 2004.
- **Shape Intrinsic Fingerprints for Free-Form Object Matching**
by **K. H. Ko**, T. Maekawa, N. M. Patrikalakis, H. Masuda, and F.-E. Wolter.
8th ACM Symposium on Solid Modeling and Applications,
pp. 196-207, Seattle, Washington, June 2003.

References

Professor N. M. Patrikalakis
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(617) 253-4555, nmp@mit.edu

Professor T. Maekawa
Yokohama National University
Department of Mechanical Engineering
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Yokohama 240-8501, Japan
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Kwang Hee Ko

Professor D. C. Gossard

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Professor K. Pochiraju

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