

PROMOTION RECOMMENDATION
The University of Michigan
College of Engineering

Hong G. Im, associate professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering, is recommended for promotion to professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering.

Academic Degrees:

Ph.D. 1994 Princeton University, Mechanical & Aerospace Engineering, Princeton, New Jersey
M.S. 1988 Seoul National University, Mechanical Engineering
B.S. 1986 Seoul National University, Mechanical Engineering Cum Laude

Professional Record:

2005 – present Associate Professor, Department of Mechanical Engineering, University of Michigan, Ann Arbor, MI
2000-2005 Assistant Professor, Department of Mechanical Engineering, University of Michigan, Ann Arbor, MI
1996-1999 Postdoctoral Researcher, Combustion Research Facility, Sandia National Laboratories, Livermore, CA
1994-1996 Research Fellow, Center for Turbulence Research, Stanford University, Stanford, CA

Summary of Evaluation:

Teaching: During his years at UM, Professor Im has regularly taught the thermo-fluids undergraduate core courses: ME235, ME320, and ME335. He has served as the course leader for ME335 since Fall 2009, and has been the Thermo-Fluids Science Area Coordinator for the past several years. At the graduate level, Professor Im revitalized two courses that are now being offered on a regular basis, ME537 *Advanced Combustion* and ME523 *Computational Fluid Dynamics*. Professor Im has a strong record in graduate student advising—he has graduated ten Ph.D. students and is currently advising three more. It is clear from the student letters that many of them appreciate Professor Im's caring attitude and effectiveness in classroom teaching. Professor Im's graduate students have been publishing with him in quality journals. Letters from his graduate students testified that he is an outstanding advisor, very knowledgeable in his field and has provided them with excellent guidance.

Research: Professor Im's research expertise is in the field of thermal-fluid sciences, with a focus on advancing fundamental understanding of laminar and turbulent combustion via rigorous theoretical and computational modeling and analysis. He has developed a solid research program at U-M, funded by various agencies, such as NSF, DoE, NASA, Korea Institute of Energy Research, US Army Tank-Automotive and Armaments Command, and US Air Force Research Laboratory. Professor Im has established himself as a leading researcher in computational modeling. He has developed high-fidelity direct numerical simulation capability to provide spatially and temporally resolved realization of laminar and turbulent reacting flows; developed one-dimensional transient opposed-jet combustion simulation with detailed chemistry and transport properties, utilizing variable-order, adaptive time integration to efficiently deal with numerical stiffness; and developed advanced combustion sub-models for full-cycle internal combustion engine simulations based on the flamelet approach. Some of the codes that he developed have now become the standard codes used by the leading computational researchers in his field. Building upon the tools that he created, Professor Im has made significant contributions in scientific discoveries, providing deep understanding of the related physical phenomena and processes.

Professor Im has a strong publication record with over 50 archival journal papers in quality journals and over 90 conference papers. His work has been praised by eminent scholars around the world and his papers are very well cited by his peers.

Recent and Significant Publications:

- Tang, S., Im, H. G., and Atreya, A., 2010, "A Computational Study of Spherical Diffusion Flames in Microgravity with Gas Radiation. Part II: Parametric Studies of the Diluent Effects on Flame Extinction," *Combustion and Flame*, 157, 127-136.
- Tang, S., Chernovsky, M. K., Im, H. G., and Atreya, A., 2010, "A Computational Study of Spherical Diffusion Flames in Microgravity with Gas Radiation. Part I: Model Development and Validation," *Combustion and Flame*, 157, 118-126.
- Wiswall, J. T., Wooldridge, M. S., and Im, H. G., 2009, "An Experimental Study of the Effects of Platinum on Methane/Air and Propane/Air Mixtures in a Stagnation Point Flow Reactor," *Journal of Heat Transfer*, 131, 111201-1-8.
- Hamosfakidis, V., Im, H. G., and Assanis, D. N., 2009, "A Regenerative Multiple Zone Model for HCCI Combustion," *Combustion and Flame*, 156, 928-941.
- Bansal, G., Im, H. G., and Lee, S. R., 2009, "Auto-Ignition of Homogeneous Hydrogen/Air Mixture Subjected to Unsteady Temperature Fluctuations," *Combustion Theory and Modelling*, 13(3), 413-425.
- Bansal, G., Im, H. G., and Lee, S. R., 2009, "Effects of Scalar Dissipation Rate Fluctuations on Auto-Ignition of Hydrogen/Air Mixture," *AIAA Journal*, 47, 468-472.
- Hong, S., Wooldridge, M. S., Im, H. G., Assanis, D. N., and Kurtz, E., 2008, "Modeling of Diesel Combustion, Soot and NO Emissions Based on a Modified Eddy Dissipation Concept," *Combustion Science and Technology*, 180, 1421-1448.
- Sankaran, R., Im, H. G., and Hewson, J. C., 2007, "Analytical Model for Auto-Ignition in a Thermally Stratified HCCI Engines," *Combustion Science and Technology*, 179, 1963-1989.
- Li, J. and Im, H. G., 2007, "Effects of Dilution on the Extinction Characteristics of Strained Lean Premixed Flames Assisted by Catalytic Reaction," *Proceedings of the Combustion Institute*, 31, 1189-1195.
- Chernovsky, M. K., Atreya, A., and Im, H. G., 2007, "Effect of CO₂ Diluent on Fuel versus Oxidizer Side of Spherical Diffusion Flames in Microgravity," *Proceedings of the Combustion Institute*, 31, 1005-1013.

Service: Professor Im has been an outstanding citizen, actively involved in serving UM and the professional community. He has served on various important departmental committees, such as the Graduate Program Committee, the InfoTech Committee, a Faculty Search Committee, and the Honors and Awards Committee. At the College level, he has been a member of the International Programs Committee. Professor Im has also played a leadership role in establishing the collaborative programs between UM and KAIST in Korea. Professor Im has also been active in serving the wider professional community. He is an associate fellow of AIAA and serves on an AIAA national technical committee on Propellant and Combustion. He is a member of the Editorial Board for the *Journal of Combustion* and for the Proceedings of the Combustion Institute. Professor Im has demonstrated leadership in organizing and chairing numerous technical sessions and has been a frequent reviewer for a large number of journals and conferences. Through these professional activities, Professor Im has utilized his technical ability to help shape the future of his technical field and broadened his impact to engineering.

External Reviewers:

Reviewer A: "...his work on boundary conditions stands out as an especially valuable contribution to the field..."

Reviewer B: "Through his outstanding contributions, Professor Im has established himself as a leader in

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Reviewer A: "...his work on boundary conditions stands out as an especially valuable contribution to the field..."

Reviewer B: "Through his outstanding contributions, Professor Im has established himself as a leader in the field of fundamental combustion and computational modeling of reacting flows."

Reviewer C: "His work is very highly regarded in the international combustion community, both in terms of physics revealed, but also in terms of techniques developed."

Reviewer D: "Dr. Im is a talented and productive scientist who made and will continue to make significant contributions to the field of combustion."

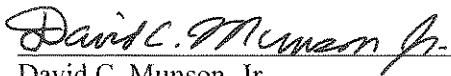
Reviewer E: "I have always found Prof. Im's work first class."

Reviewer F: "He is among the best of his peer group."

Reviewer G: "...Hong Im is one of the international leaders in the topic area of direct numerical simulation of combustion."

Reviewer H: "Dr. Im has the highest quality of research that remarkably is sustained over numerous publications... Dr. Hong Im is one of the top 10 in the world."

Summary of Recommendation: Hong Im is a great asset to U-M. He has contributed strongly in teaching, research, and service. He has taught a good mix of undergraduate and graduate courses and revised two graduate level classes. He has graduated a good number of Ph.D. students. The letters from the students indicate that he is an effective teacher and a fine mentor. As a researcher, he has made a name in the field of combustion and is well recognized as a leader in computational modeling. He has established a vibrant research program and a strong publication record. The external evaluators praise him for his research quality and contributions. In service, Professor Im has been an outstanding citizen and leader serving U-M and the professional community with distinction. It is with the support of the College of Engineering Executive Committee that I recommend Hong G. Im for promotion to professor of mechanical engineering, with tenure, College of Engineering.



David C. Munson, Jr.

Robert J. Vlasic Dean of Engineering

College of Engineering

May 2011