

## PROMOTION RECOMMENDATION

The University of Michigan  
College of Engineering

Approved by the Regents

May 14, 2009

Mahta Moghaddam, associate professor of electrical engineering and computer science, with tenure, Department of Electrical Engineering and Computer Science, College of Engineering, is recommended for promotion to professor of electrical engineering and computer science, with tenure, Department of Electrical Engineering and Computer Science, College of Engineering.

### Academic Degrees:

Ph.D. 1991 University of Illinois, Electrical Engineering, Urbana-Champaign  
M.S. 1989 University of Illinois, Electrical Engineering, Urbana-Champaign  
B.S. 1986 University of Kansas, Electrical Engineering (with Highest Distinction), Lawrence, KS

### Professional Record:

2006-present: Associate Professor, (with tenure), Department of Electrical Engineering and Computer Science, University of Michigan  
2003-2006: Associate Professor, (without tenure), Department of Electrical Engineering and Computer Science, University of Michigan  
1991-2003: Senior Engineer, Radar Science and Engineering Section, Jet Propulsion Laboratory, Pasadena, CA

### Summary of Evaluation:

Teaching: Professor Moghaddam is a highly motivated teacher who passionately seeks to improve course content and continuously challenges and mentors her students by skillfully guiding them into new thinking patterns and research directions. In the short time she has been at Michigan, Professor Moghaddam has overhauled two graduate courses in radar remote sensing, EECS 631 (Advanced Electromagnetic Scattering) and EECS 632 (Active Microwave Remote Sensing), and very successfully taught EECS 330 (Electromagnetics II), one of the department's most challenging undergraduate courses. Her Q1 and Q2 averages typically range 4.4 to 4.7 and 4.7 to 4.9, respectively. She supervises two post-doctoral associates, has graduated one M.S. and three Ph.D. students, and has eight additional Ph.D. students in the pipeline.

Research: Professor Moghaddam's research is in the area of electromagnetic environmental sensing (EES), namely the use of electromagnetic signals and waves to characterize terrestrial and planetary structures and (human-induced) changes therein. Her research involves theoretical modeling, numerical simulations, and experiments. Professor Moghaddam is considered among the leading EES researchers worldwide. Professor Moghaddam has routinely published refereed papers, conference papers and abstracts, all in reputable journals and conference proceedings. Several publications have been with her students. She has built up a top-ranked EES laboratory including a tower-mounted multifrequency pulsed radar system that is unique in the United States. Professor Moghaddam has been successful in securing substantial research funding from federal sources. Recently, she has broadened her research scope by applying imaging methods she developed in her EES research to the detection of breast cancer. Based on early results of this research, one of her students has been awarded a prestigious DoD fellowship. Professor Moghaddam recently was elected Fellow of the Institute of Electrical and Electronic Engineers (IEEE) for contributions to forward and inverse scattering techniques for radar remote sensing.

#### Recent and Significant Publications:

- Kuo, C.H. and Moghaddam, M., "A theoretical analysis of backscattering enhancement of surface plasmons from multilayer rough surfaces," *IEEE Transactions on Antennas and Propagation*, vol. 56, no. 4, pp. 1133-1143, April 2008.
- Moghaddam, M., Rahmat-Samii, Y., Rodriguez, E., Entekhabi, D., Moller, D., Hoffman, J., and Pierce, L., "Microwave observatory of subcanopy and subsurface (MOSS): A mission concept for global deep and subcanopy soil moisture observations," *IEEE Transactions on Geoscience Remote Sensing*, vol. 45, no. 8, pp. 2630-2644, August 2007.
- Kuo, C.H. and Moghaddam, M., "Scattering from Multilayer Rough Surfaces based on the Extended Boundary Condition Method and Truncated Singular Value Decomposition," *IEEE Transactions on Antennas and Propagation*, vol. 54, no. 10, pp. 2917-2930, October 2006.
- Kuo, C.H. and Moghaddam, M., "Electromagnetic Scattering From a Buried Cylinder in layered media with Rough Interfaces," *IEEE Transactions on Antennas and Propagation*, vol. 54, no. 8, pp. 2392-2401, August 2006.
- Tabatabaenejad, A. and Moghaddam, M., "Bistatic scattering from layered rough surfaces," *IEEE Transactions on Geoscience Remote Sensing*, vol. 44, no. 8, pp. 2102-2115, August 2006.
- Liang, P., Pierce, L., and Moghaddam, M., "Radiative Transfer Model for Microwave Biostatic Scattering from Forest Canopies," *IEEE Transactions on Geoscience Remote Sensing*, vol. 43, no. 11, 2005.

Service: Professor Moghaddam has an exemplary record of service both at Michigan and externally in professional societies and federal agencies. Internally, she serves as chair of the Electrical Engineering Program Committee and as a member of the Department and College of Engineering Curriculum Committees, as well as the Rackham Michigan Mentoring Initiative Committee. Externally, Professor Moghaddam serves as chair of the IEEE Geosciences and Remote Sensing local chapter, as associate and guest editor of key journals in her field, and on an important NASA team defining a future mission to map the Earth's soil moisture.

#### External Reviewers:

Reviewer A: "She is known for her research on the modeling of multi-layered vegetated and bare soils using microwave (SAR) and optical (hyper-spectral) remote sensing which is essential for analyzing the global bio mass and hydrology. She is considered an expert in this discipline and ranks among ~ the top ten internationally."

Reviewer B: "Dr. Moghaddam was well-regarded as a young researcher at JPL, but has now achieved an international level of recognition and respect within the radar community for her research contributions that is comparable to the best in the U.S. and Europe (both widely considered to be the most advanced in these areas). She is respected both as a mathematician and an engineer, which are equally important to her research program."

Reviewer C: "...recognized her expertise to be electromagnetic scattering of radar signals. She has a set of publications on the subject that speak for themselves. ... There are very few (if any in the current generation) persons in the field who - in the topic of Earth microwave remote sensing - have the breadth and depth of knowledge that is comparable to Dr. Moghaddam."

Reviewer D: "Dr. Moghaddam's research has always struck me as being of the highest caliber [sic]. She takes on challenging problems - inversion of multi-parameter SAR data is difficult, and her work on recovery of sub-canopy and sub-surface soil moisture in particular is very significant. Applied globally, it has the potential to allow improved productivity in agriculture, in addition to furthering our understanding of the Earth's hydrologic cycle."

Reviewer E: "Mahta has impressed me and many others with her pioneering work in inverse problems. ... I have been truly impressed by the quality and focus of Prof. Moghaddam's research. Her publications after joining Michigan have been excellent. She has selected the important area of remote sensing as her main focus. This focus has paid off, as the large amount of research funding awarded to her has testified."

Reviewer F: "Mahta is a productive researcher and her progress in performing advanced research is very admirable. As I mentioned she has been involved in several very interesting projects at JPL and now at U of Michigan. These responsibilities have demanded her not only to be a good researcher but also a skilled project manager."

Reviewer G: "In her research in microwave remote sensing, she has had a leadership role. ... She has also distinguished herself in being able to lead a large team project. The leadership trait is very important for NASA to address key issues in remote sensing usage for global monitoring studies."

Reviewer H: "I particularly like her paper in TGRS on monitoring tree moisture from data collected during the BOREAS experiment. In this paper she describes her experiment, shows the data that were collected in an understandable manner, and develops an estimation algorithm designed to extract moisture values from the observations. This type of paper demonstrates her comprehensive abilities and sets a good standard for experimental science."

Summary of Recommendation: Professor Moghaddam is a prominent electrical engineer who has made important contributions to the field of electromagnetic environmental sensing. She has excelled as a mentor and teacher, and carried significant internal and external service duties. It is with the support of the College of Engineering Executive Committee that I recommend Mahta Moghaddam for promotion to professor of electrical engineering and computer science, with tenure, Department of Electrical Engineering and Computer Science, College of Engineering.



David C. Munson, Jr.  
Robert J. Vlasic Dean of Engineering  
College of Engineering

May 2009