

PROMOTION RECOMMENDATION
The University of Michigan
College of Engineering

Veera Sundararaghavan, assistant professor of aerospace engineering, Department of Aerospace Engineering, College of Engineering, is recommended for promotion to associate professor of aerospace engineering, with tenure, Department of Aerospace Engineering, College of Engineering.

Academic Degrees:

Ph.D.	2007	Cornell University, Mechanical Engineering, Ithaca, NY
M.S.	2006	Cornell University, Mechanical Engineering, Ithaca, NY
M.Tech/B.Tech	2003	Indian Institute of Technology, Mechanical Engineering, Madras, India

Professional Record:

2007–present	Assistant Professor, Department of Aerospace Engineering, University of Michigan
2011	AFRL Summer Faculty, Air Force Research Lab, Dayton OH
2007	Graduate Research Assistant, Cornell University, Ithaca, NY

Summary of Evaluation:

Teaching: Professor Sundararaghavan's record of classroom teaching is strong, as evidenced by the five courses offered across the undergraduate and graduate levels and their positive student course evaluations. He is an excellent mentor and advisor. He has graduated one Ph.D. student and currently mentors another four. He also has supervised 10 undergraduate projects and three M.S. projects. He introduced an advanced special topics course, AE 714, "Atomistic Modeling of Materials," into the graduate curriculum and has participated in CRLT functions. Professor Sundararaghavan has successfully co-authored papers with his graduate students and works closely with them.

Research: Professor Sundararaghavan has a strong record of research funding and publications in the area of multiscale modeling. He has a distinguished funding record, including two prestigious young investigator awards (NSF CAREER, and the Defense Threat Reduction Agency Young Investigator Award - one of 10 awarded per year nationally), participation in three large multi investigator grants and several single PI grants. Professor Sundararaghavan's publication record includes 18 journal articles in the best and most appropriate journals and 17 refereed conference papers. In addition, he lists over 20 invited presentations. He is clearly on his way to becoming a leader in the field of multiscale modeling, as several letters point out.

Recent and Significant Publications:

- S. Sun and Veera Sundararaghavan, "A probabilistic crystal plasticity model for modeling grain shape effects based on slip geometry," *Acta Materialia*, Vol. 60, p. 5233-5244, 2012.
- V. Sundararaghavan and A. Kumar, "Probabilistic modeling of microstructure evolution using finite element representation of statistical correlation functions," *International Journal of Plasticity*, Vol. 30-31, pp. 62-80, 2012.
- S. Lee and V. Sundararaghavan, "Multi-scale modeling of moving interface problems with flux and field jumps: Application to oxidative degradation of ceramic matrix composites," *International Journal of Numerical Methods in Engineering*, Vol. 85(6), pp. 784--804, 2011.

- V. Sundararaghavan and A. M. Waas, "Non-local continuum modeling of carbon nanotubes: Physical interpretation of non-local kernels using atomistic simulations," *Journal of Mechanics and Physics of Solids*, Vol. 59(6), p. 1191-1203, 2011.
- V. Sundararaghavan and N. Zabaras, "A statistical learning approach for the design of polycrystalline materials, *Statistical Analysis and Data Mining*," Vol. 1, Issue 5, pp. 306--321, 2009.
- V. Sundararaghavan and N. Zabaras, "A multi-length scale continuum sensitivity analysis for the control of texture-dependent properties in deformation processing," *International Journal of Plasticity*, Vol. 24, pp. 1581-1605, 2008.
- S. Lee and V. Sundararaghavan, "Multiscale modeling of moving interface problems with flux jumps: Application to solidification," *Computational Mechanics*, Vol. 44(3), pp. 297-307, 2009.
- V. Sundararaghavan and N. Zabaras, "Weighted multi-body expansions for computing stable structures of multi-atom systems," *Physical Review B*, Vol. 77 (6) pp. 064101-1--064101-10, 2008.
- V. Sundararaghavan and N. Zabaras, "Linear analysis of texture-property relationships using process-based representations of Rodrigues space," *Acta Materialia*, Vol. 55, Issue 5, pp. 1573-1587, 2007.
- V. Sundararaghavan and N. Zabaras, "Design of microstructure-sensitive properties in elasto-viscoplastic polycrystals using multi-scale homogenization," *International Journal of Plasticity*, Vol. 22, pp. 1799-1824, 2006.

Service: Professor Sundararaghavan was a key contributor to the department's new web site, and he is an active member on the undergraduate curriculum committee. He made himself available to the College as a student poster judge, doctoral committee member, and participated on CRLT panels and in reviews of internal research awards for incoming faculty. He has organized two mini-symposia at international conferences, and participated as a panelist at NIST. In addition, he has been a referee for most of the relevant journals in his field, including the *International Journal of Plasticity*, *Physical Review B*, *Acta Materialia*, and the *Journal of Mechanics and Physics of Solids*.

External Reviewers:

Reviewer A: "...I find Dr. Sundararaghavan is on an excellent research trajectory and is well worthy of this promotion. Moreover, he appears to be passionate about teaching...Based on his work that I have reviewed, I rate him in the top echelon of scholars in the field of computational mechanics at a similar stage in their careers."

Reviewer B: "These [technology transfer] are probably best cached in terms of Dr. Sundararaghavan's efforts to make his software open-source and used by scientists outside of his laboratory. He seems committed to this endeavor and appears to have had some success with technology transfer. I would say that he has probably put more effort into these kind of activities than most of his contemporaries... Dr. Sundararaghavan appears to be well positioned to maintain a healthy research program headed into the near future...Dr. Sundararaghavan has established his intellectual independence from his advisor and his PhD work with high-quality publications...In my opinion, the quality of his work is certainly high enough that his most recent publications should garner quite a bit more attention from the computational mechanics community in the near future."

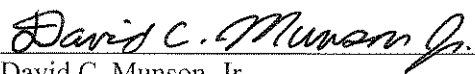
Reviewer C: "The candidate's broader impact in technology transfer appears to be above average for a computational researcher due to his closer interactions with the defense laboratories."

Reviewer D: "Dr. Sundararaghavan is writing important papers, and is poised to become a leader in an area of major priority for the US."

Reviewer E: “He has developed a funded research program in this highly competitive area and is collaborating with several recognized experts in the field...Each of Dr. Sundararaghavan’s journal articles make clearly elucidated contributions to the literature.”

Reviewer F: “He is able to meld concepts from different fields and scales including quantum, micro and macro in a seamless and effortless fashion...I find this work to be very elegant and illustrate the innovation consistently associated with Veera’s research...Veera has pioneered the use of probabilistic finite element method in the analysis of microstructures, which is best to date in this field...This work confronts and deals with the stochastic nature of microstructures of materials...which is often overlooked or ignored in computational modeling of materials.”

Summary of Recommendation: Veera Sundararaghavan has established his ability to contribute to teaching, research and service in significant ways leading to substantial external recognition. He has demonstrated the scholarship, vision, and energy of an accomplished researcher. He has built a solid base of service on which to build as he moves forward in his career at Michigan. He has proved to be an excellent educator, and all evidences point to his commitment and passion to our students. It is with the support of the College of Engineering Executive Committee that I recommend Veera Sundararaghavan for promotion to associate professor of aerospace engineering, with tenure, Department of Aerospace Engineering, College of Engineering.



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

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