Approved by the Regents
May 17, 2007

PROMOTION RECOMMENDATION
The University of Michigan
College of Engineering

Bogdan Epureanu, assistant professor of mechanical engineering, Department of Mechanical Engineering, College of Engineering, is recommended for promotion to associate professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering.

Academic Degrees:

Ph.D.	1999	Duke University, Mechanical Engineering, Durham, NC
M.S.	1993	Galati University, Romania, Mechanical Engineering, Romania
B.S.	1992	Galati University, Romania, Controls and Computer Science, Romania

Professional Record:

2002 - present	Assistant Professor, Department of Mechanical Engineering, University of Michigan
2005 - 2006	Air Force Summer Faculty Fellow, Air Force Research Labs, Air Vehicles Directorate, Wright-Patterson Air Force Base
2000 - 2002	Assistant Professor, Department of Mechanical Engineering, McGill University
1999 - 2000	Assistant Professor, Department of Mechanical Engineering and Aerospace Engineering, Carleton University
1999	Post-Doc Research Assistant, Department of Mechanical Engineering and Materials Science, Duke University

Summary of Evaluation:

Teaching: Professor Epureanu is an outstanding educator. He has taught a large core undergraduate class (ME 240, Introduction to Dynamics and Vibrations) with outstanding evaluations (Q1=3.98 and Q2=4.32). In parallel, he has taken the initiative to develop a new graduate level class in nonlinear dynamics, as well as to teach and revitalize an existing class (ME 648) in nonlinear dynamics. His teaching evaluations for graduate level classes indicate a strong record (Q1=4.27 and Q2=4.59). Professor Epureanu is currently supervising six doctoral students (one co-supervised). He has graduated his first doctoral student from Michigan, as well as one of his former doctoral students from McGill University. His graduate students speak glowingly about his concern and effective mentoring along with his technical excellence. Furthermore, his program attracts outstanding students (two NSF Predoctoral Fellows are currently in his group, his first PhD student has a faculty offer in Taiwan).

Research: Professor Epureanu's research focuses on developing nonlinear and chaotic tools for investigations in structural dynamics and fluid-structure interactions. His principal research contributions include reduced order models of aeroelasticity for studies of airfoils and jet engine turbomachinery, structural health monitoring techniques, and the analysis of pattern formation in nonlinear attractors with applications to machining processes. He has successfully secured funding as a single PI, including the prestigious NSF CAREER award and sustained a high-quality research program. Professor Epureanu has published 33 full-length refereed journal papers and one technical brief in the most prestigious journals, and 43 refereed conference papers. He has published one half of his journal articles after joining the University of Michigan, and co-authored 10 of them with his students. Overall, his publication record is very impressive, in terms of the quantity of papers, the quality of the journals, and the wide range of fields. As noted by the external evaluators, the candidate combines creativity and rigor in his research. He has made a number of original contributions of a fundamental nature and of enduring academic

impact, and has also provided advanced solutions to important engineering problems arising in a variety of applications, thus impacting the industrial community.

Recent and Significant Publications:

S. H. Yin and B. I. Epureanu: "Structural Health Monitoring Based on Sensitivity Vector Fields and Attractor Morphing", *Philosophical Transactions of the Royal Society of London: A - Mathematical, Physical and Engineering Sciences*, Vol. 364(1846), pp. 2515-2538, 2006.

A. Hashmi and B. I. Epureanu: "Sensitivity Resonance and Attractor Morphing Quantified by Sensitivity Vector Fields for Parameter Reconstruction", *Nonlinear Dynamics*, Vol. 45(3-4), pp.319-335, 2006.

K. D'Souza and B. I. Epureanu: "Damage Detection in Nonlinear Systems Using System Augmentation and Generalized Minimum Rank Perturbation Theory", *Smart Materials and Structures*, Vol. 14(5), pp. 989-1000, 2005.

S. H. Yin and B. I. Epureanu: "Enhanced Nonlinear Dynamics and Monitoring Bifurcation Morphing for the Identification of Parameter Variations", *Journal of Fluids and Structures*, Vol. 21(5-7), pp. 543-559, 2005.

B. I. Epureanu, S. H. Yin, and M. M. Derriso: "High-Sensitivity Damage Detection Based on Enhanced Nonlinear Dynamics", *Smart Materials and Structures*, Vol. 14(2), pp. 321-327, 2005.

B. I. Epureanu, S. H. Yin, and E. H. Dowell: "Enhanced Nonlinear Dynamics for Accurate Identification of Stiffness Loss in a Thermo-Shielding Panel", *Nonlinear Dynamics*, Vol. 39(1-2), pp. 197-211, 2005.

B. I. Epureanu and S. H. Yin: "Identification of Damage in an Aeroelastic System Based on Attractor Deformations", *Computers and Structures*, Vol. 82(31-32), pp. 2743-2751, 2004.

B. I. Epureanu, L. S. Tang, and M. P. Paidoussis: "Exploiting Chaotic Dynamics for Detecting Parametric Variation in Aeroelastic Systems", *AIAA Journal*, Vol. 42(4), pp. 728-735, 2004.

Service: Professor Epureanu is also an exemplary "citizen" who has taken on many departmental, local, national, and international service duties. He is the departmental course leader for a large undergraduate class and the faculty advisor for Pi Tau Sigma. He has served on 29 PhD and several University committees. He has fostered diversity by mentoring several female undergraduate researchers in addition to attending workshops on diversity at the university level. He has initiated a multi-faceted outreach activity involving the Ann Arbor Hands-On Museum. He has organized conferences and symposia, guest edited journal issues and served in various technical committees in his field, including being named as chair of the ASME Applied Mechanics Division's Technical Committee on Dynamics and Controls of Systems.

External Reviewers:

Reviewer (A): "... and comparing him to his peers in the US, Europe and Asia, his fresh approach based on a firm footing in nonlinear dynamics places him in a class of his own."

Reviewer (B): "In terms of contributions to and impact on the field of dynamics and vibration, I'd be hard-pressed to name someone currently at the level of assistant professor with an equivalent portfolio of accomplishments."

Reviewer (C): "...the candidate is a star performer ... one who is destined to do even better as time goes on. ...an 'open and shut case'."

Reviewer (D): "These approaches make use of two new concepts, originated by Bogdan, known as the 'sensitivity vector field' and 'attractor morphing.' ...is crucial in application areas such as dynamic structural health monitoring and damage detection. Bogdan has achieved a record that is well above the

threshold expected for a person being considered for promotion at any university. In fact, this is one of the strongest cases I've seen in my seventeen years of doing such evaluations."

Reviewer (E): "[The candidate] has published a series of papers in some of the most respected archival journals in these fields..."

Reviewer (F): "Professor Epureanu is one of the few who utilizes rigorous nonlinear system theory to attack such a challenging problem, where he has created some very unique tools that could advance the state of the art by greatly improving the accuracy of the identification results."

Summary of Recommendation: In summary, Professor Epureanu has excelled as an assistant professor. He is an exceptional teacher, an outstanding researcher, and a leader in service, as evidenced by his casebook and the number of prestigious awards he has received. It is rare to see such a very high level of performance in *every* one of these areas for a junior faculty member. Without a doubt, he is on an exceptional track that places him amongst the top few junior faculty members in the country. All the external and internal referees have recommended that Professor Epureanu be granted promotion and tenure. It is with the support of the College of Engineering Executive Committee that I recommend Bogdan Epurneau for promotion to associate professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering.

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

May 2007