

PROMOTION RECOMMENDATION  
THE UNIVERSITY OF MICHIGAN  
MEDICAL SCHOOL  
DEPARTMENT OF SURGERY  
MEDICAL SCHOOL AND COLLEGE OF ENGINEERING  
DEPARTMENT OF BIOMEDICAL ENGINEERING

C. Alberto Figueroa, Ph.D., associate professor of surgery, with tenure, Department of Surgery, Medical School, and associate professor of biomedical engineering, without tenure, Department of Biomedical Engineering, Medical School and College of Engineering, is recommended for promotion to professor of surgery, with tenure, Department of Surgery, Medical School, and professor of biomedical engineering, without tenure, Department of Biomedical Engineering, Medical School and College of Engineering.

Academic Degrees:

Ph.D.	2006	Stanford University
M.S.	2000	Stanford University
M.S.	1998	Universidade da Coruña, Spain

Professional Record:

2014-present	Associate Professor of Surgery and Associate Professor of Biomedical Engineering, University of Michigan
2014-present	Honorary Senior Lecturer, King's College London, United Kingdom
2011-2014	Associate Professor in Biomedical Engineering, King's College London, United Kingdom

Summary of Evaluation:

Teaching: Since his arrival to the University of Michigan, Dr. Figueroa has been involved in undergraduate and graduate student teaching, as well as mentoring of several clinical fellows and post-doctoral fellows. The teaching has consisted of lectures, computer lab demonstrations, and laboratory teachings in the setting of journal clubs. Dr. Figueroa has been involved in five dissertation committees in various roles (chair and member). In addition, Dr. Figueroa has served in the qualifying exam panel of three of his Ph.D. students. Dr. Figueroa has received very good teaching evaluations: In BIOMEDE350, he received a 4.66/5.00 in 2016, and a 3.88/5.00 in 2017. In BIOMDE450, he received a 4.95/5.00 in 2016.

Research: Dr. Figueroa's research is in computational modeling of subject-specific hemodynamics. Dr. Figueroa's research spans widely from theory to applications. On the theoretical side, he has developed numerous computational methods for multi-scale modeling of blood flow, with an emphasis on studying the interplay between altered hemodynamics, vessel stiffness, and hypertension. On the application side, Dr. Figueroa has been actively collaborating with cardiologists, vascular surgeons and cardiac surgeons, bringing computational modeling to the clinic to aid in virtual surgical planning and medical device evaluation. He currently has 61 peer-review publications, and several more submitted. Dr. Figueroa has received several awards through his career for his research in endovascular procedures. Recently, he received the BME departmental award in recognition of his research efforts and collaborations with clinicians in the Cardiovascular Center. Dr. Figueroa is currently very well-funded with active awards from the NIH, NSF, the European Research Council, and several internal

Michigan grants. He is currently the principal investigator of an R01 on large artery stiffness and a U01 on multi-scale modeling of pulmonary hypertension in the pediatric population. He is also the PI of a European grant on computational tools for blood flow modeling, a project he has been managing since his arrival at Michigan through an adjunct appointment he has maintained at his previous institution, King's College London. Lastly, he is a co-PI of an NSF grant on data-driven modeling and high-performance computing. Dr. Figueroa has demonstrated robust collaborations with numerous departments within the Medical School and the College on Engineering. He has been invited to give over 30 extramural invited lectures and has been in the editorial board of the *Journal of Biomechanical Engineering* and the *Journal of Endovascular Therapy* for several years, and has been a reviewer for several research agencies in Europe.

#### Recent and Significant Publications:

Dillon-Murphy D, Noorani A, Nordsletten D, Figueroa CA: Multi-modality image-based computational analysis of haemodynamics in aortic dissection. *Biomech Model Mechanobiol* 15:857-876, 2016.

Humphrey JD, Harrison DG, Figueroa CA, Lacolley P, Laurent S: Central artery stiffness in hypertension and aging: A problem with cause and consequence. *Circ Res* 118:379-381, 2016.

Arthurs CJ, Lau KD, Asrress KN, Redwood SR, Figueroa CA: A mathematical model of coronary blood flow control: simulation of patient-specific three-dimensional hemodynamics during exercise. *Am J Physiol Heart Circ Physiol* 310:H1242-1258, 2016.

Nauta FJ, Lau KD, Arthurs CJ, Eagle KA, Williams DM, Trimarchi S, Patel HJ, Figueroa CA: Computational fluid dynamics and aortic thrombus formation following thoracic endovascular aortic repair. *Ann Thorac Surg* 103:1914-1921. 2017.

Cuomo F, Roccabianca S, Dillon-Murphy D, Xiao N, Humphrey JD, Figueroa CA: Effects of age-associated regional changes in aortic stiffness on human hemodynamics revealed by computational modeling. *PLoS One* 12:e0173177, 2017.

Service: Dr. Figueroa has an outstanding service record. He has served as the Biomedical Engineering (BME) representative at the CoE Curriculum Committee (2016), as the BME Graduate Admissions Chair (2016 and 2017), and as the BME Diversity, Equity and Inclusion lead. He has also been very involved with MICDE (Michigan Institute for Computational Discovery and Engineering) serving both in its managing committee, as well as in its Technology Services Steering committee. Dr. Figueroa has been involved in the organization of National and International scientific meetings for over a decade. He has served as the growth, remodeling, and repair theme leader for the Summer Biomechanics, Bioengineering, and Biotransport conference for the last three years. He is reviewer for over 30 journals in the fields of mechanics, applied mathematics, vascular and endovascular surgery, and medical imaging.

#### External Reviewers:

Reviewer A: "For as long as I remember, Alberto's group was always at the forefront of the computational biomedical research....Alberto's career so far has been unique in combining the very strong methodological developments in computational mechanics, with leading-edge clinical practice. More common in other fields, in the medical science such combination is very rare. It is, however,

essential for the grand challenges related to the aging societies that the potential of modern engineering methods is fully exploited in the health sciences.”

Reviewer B: “Dr. Figueroa has certainly distinguished himself among his peers in the field. His breadth, ranging from fundamental methodology development, to clinical applications, is particularly noteworthy. Dr. Figueroa has a strong publication record, with highly cited papers, equally reflecting the rand quality of his work. Dr. Figueroa’s work has been impactful. I believe it is important for computational mechanics to translate into clinical use, and Dr. Figueroa has been doing exactly that.”

Reviewer C: “Dr. Figueroa’s work has been impactful. I believe it is important for computational mechanics to make its way into clinical use, and Dr. Figueroa has been doing exactly that.”

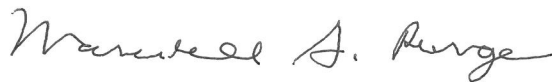
Reviewer D: “Dr. Figueroa is an acknowledged leader in the field of blood flow modeling...He currently holds 3 journal editorship roles, which is a good number for someone at his career stage. He has organized a large number of external symposia, and has a very high profile in the community from this activity.”

Reviewer E: “...Dr. Alberto Figueroa has rapidly developed an international reputation as one of the top cardiovascular fluid mechanics experts in the world. His work is compelling both in advancing the field of cardiovascular fluid mechanics and in applying biomechanics to improve clinical therapies. Furthermore, his productivity and impact are accelerating rapidly, suggesting that his success so far is only the beginning.”

Reviewer F: “Dr. Figueroa’s record of performance, current level of funding and role in development of important new basic and translational studies ensure that he will continue on his brilliant path to academic excellence and leadership.”

Summary of Recommendation:

Dr. Figueroa has exhibited outstanding academic and educational productivity. He has published cutting edge research and has attracted extramural funding for research from the National Institutes of Health. His research work is at the forefront of his field, and his ability to combine methodological developments in computational mechanics with leading edge clinical practice is unique. We are pleased to recommend C. Alberto Figueroa, Ph.D. for promotion to professor of surgery, with tenure, Department of Surgery, Medical School, and professor of biomedical engineering, without tenure, Department of Biomedical Engineering, Medical School and College of Engineering.



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Marschall S. Runge, M.D., Ph.D.  
Executive Vice President for Medical Affairs  
Dean, Medical School



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Alec D. Gallimore, Ph.D.  
Robert J. Vlasic Dean of Engineering  
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