

MID-YEAR UPDATE SPRING 2020



LEHIGH
UNIVERSITY

P.C. Rossin College of Engineering and Applied Science

CHAIR'S MESSAGE

DEAR LEHIGH ISE COMMUNITY,

The content of this edition of the Mid-Year Update Spring 2020 speaks for the quality of our Department.

Our faculty continues to receive awards, one after the other. In this update you will learn that three of our mid-career faculty (Frank Curtis, Daniel Robinson, and Luis Zuluaga) have won journal awards for papers they recently published; but there is more to come — stay tuned!

We are happy to announce that we have a new Communications Specialist, Sheila Dorney, who started working for us early February 2020. We thank Alison O'Connell for her dedication to the ISE Department. Alison is still with us at Lehigh, but now as a development researcher.

As I am sure you are aware of, Mohler Lab has always been in continuous renovation to bring it to the highest standards in education and technology. The contribution of our dear alumni network has been fundamental to this endeavor. We are now in the process of making Mohler a model of reference (representation) in signage and communications!

Winter has been very mild in the Lehigh Valley. I wish you all an enjoyable Spring.



LUIS NUNES VICENTE

ISE Department Chair

ISE DEPARTMENT MID-YEAR NEWSLETTER | SPRING 2020

DEPARTMENT CHAIR

Dr. Luis Nunes Vicente
lnv@lehigh.edu

ASSOCIATE CHAIR

Dr. George Wilson
grw3@lehigh.edu

ISE DEPARTMENT STAFF

Communications Specialist
Sheila Dorney
skd220@lehigh.edu

Department & Graduate
Coordinator
Jennifer Vargas
jav319@lehigh.edu

HSE Coordinator
Linda Wismer
liw511@lehigh.edu

READER FEEDBACK

Please send comments to the editor at skd220@lehigh.edu

ISE remembers Everett Van Hoesen '55

Everett Van Hoesen, Industrial and Systems Engineering (ISE) Department alumni, passed away on September 3, 2019 in Naples, Florida. He is survived by his wife Alice and five children: Richard, Mark, Karen, Kimberly, and David. He earned his B.S. in Industrial Engineering from Lehigh University in 1955. He also held executive degrees from Columbia and Harvard Business Schools. At Lehigh he was a Distinguished Military Graduate, attained membership in the engineering honor society Tau Beta Pi, and was honored with the ISE Distinguished Alumni Award for Excellence in Industry in 2014. He had an abiding interest in advanced education and served prominently on advisory committees at Lehigh.

In addition, through a generous gift from the Van Hoesen family, the Van Hoesen Family Best Publication Competition was established in the ISE Department in 2015. The competition is open to all Lehigh ISE Department students and recognizes excellence in research.

Lehigh INFORMS Student Chapter wins fifth-straight award



The Lehigh student chapter of The Institute for Operations Research and Management Sciences (INFORMS) received a cum laude Student Chapter Award at the organization's annual meeting in Seattle, Washington. This is the fifth year that the student group,

comprised of Industrial and Systems Engineering graduate students, have been recognized in the top 20% of student chapters. The purpose of the Student Chapter Annual Award is to recognize achievements of student chapters and to motivate them to perform well.

The Lehigh student chapter of INFORMS is very active in the department. They host a weekly seminar at which PhD students present research, invite distinguished speakers to campus, and plan social events such as a potluck and picnic for students and faculty. For more information, visit:

coral.ise.lehigh.edu/informs



Paper by ISE Faculty Wins Optimization Letters Best Paper Award 2018

A paper written by ISE Associate Professors Frank E. Curtis and Daniel P. Robinson, along with Zachary Lubbarts of Johns Hopkins University, has been named the winner of the 2018 Optimization Letters (OPTL) Best Paper Award for their work entitled “Concise Complexity Analyses for Trust Region Methods.” Optimization Letters is a journal that covers all aspects of optimization, including theory, algorithms, computational studies, and applications.

The OPTL Best Paper Award carries a \$1,000 USD prize and a plaque. This year the Best Paper Award Selection Committee included OPTL Editorial Board members Dr. Sandra D. Eksioglu (University of Arkansas), Dr. Jean-Philippe Richard (University of Minnesota), and Dr. Julius Žilinskas (Vilnius University).

The abstract for Professors Curtis and Robinson’s winning paper is as follows:

Concise complexity analyses are presented for simple trust region algorithms for solving unconstrained optimization problems. In contrast to a traditional trust region algorithm, the algorithms considered in this paper require certain control over the choice of trust region radius after any successful iteration. The analyses highlight the essential algorithm components required to obtain certain complexity bounds. In addition, a new update strategy for the trust region radius is proposed that offers a second-order complexity bound.

The ISE department congratulates Professors Curtis and Robinson for their excellent contribution to literature.



Ph.D Student Xiaolong Kuang in Collaboration with Professor Luis F. Zuluaga Wins the 2019 Journal of Global Optimization Best Paper Award



A paper written by ISE Graduate Student Xiaolong Kuang in collaboration with Professor Luis F. Zuluaga, has been named one of two winners of the 2019 Journal of Global Optimization Best Paper Award for their work entitled “Completely Positive and Completely Positive Semidefinite Tensor Relaxations for Polynomial Optimization.” The

Journal of Global Optimization is an international journal concerned with theoretical and computational aspects of seeking global optima and their applications.

The Journal of Global Optimization Best Paper Award carries a monetary prize of \$1,000 USD. This year the Best Paper Award Selection Committee included Leo Liberti, Ivana Ljubic, Ruth Misener, and Jean-Phillipe Richard.

The abstract for Xiaolong Kuang and Professor Luis F. Zuluaga winning paper is as follows:

Completely positive (CP) tensors, which correspond to a generalization of CP matrices, allow to reformulate or approximate a general polynomial optimization problem

(POP) with a conic optimization problem over the cone of CP tensors. Similarly, completely positive semidefinite (CPSD) tensors, which correspond to a generalization of positive semidefinite (PSD) matrices, can be used to approximate general POPs with a conic optimization problem over the cone of CPSD tensors. In this paper, we study CP and CPSD tensor relaxations for general POPs and compare them with the bounds obtained via a Lagrangian relaxation of the POPs. This shows that existing results in this direction for quadratic POPs extend to general POPs. Also, we provide some tractable approximation strategies for CP and CPSD tensor relaxations. These approximation strategies show that, with a similar computational effort, bounds obtained from them for general POPs can be tighter than bounds for these problems obtained by reformulating the POP as a quadratic POP, which subsequently can be approximated using CP and PSD matrices. To illustrate our results, we numerically compare the bounds obtained from these relaxation approaches on small scale fourth-order degree POPs.

The ISE Department congratulates Xiaolong Kuang and Professor Luis F. Zuluaga for their excellent contribution to literature.



LEHIGH
UNIVERSITY



P.C. Rossin College of
Engineering and Applied Science

