



Safety Engineering and Risk/Reliability Analysis Division Newsletter

Vol. 2-March 2019 Edition

CHAIR'S NOTE

Contents

- 1 Chair's Note
- 2 Introduction of a Book on Risk and/or Reliability
- 3 Physics of Failure Based Reliability Assessment for Systems Exposed to Sliding Wear under uncertainty
- 4 ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems
- 5 Workshop on Risk Analysis of Autonomous Vehicles
- 6 Student Paper Contest
- 7 IMECE
- 8 Call for Papers
- 10 2018-2019 SERAD Leadership Team

Bin Zou, Ph.D

2018-2019 SERAD Chair

Dear SERAD Members,

Time flies! In the last several months, we have been busy preparing for our annual technical paper track at the 2019 International Mechanical Engineering and Congress and Exposition (IMECE) in November, at Salt Lake City, UT. This year we have over 50 abstracts submitted to 10 topics. Thanks to our hardworking track and topic chairs, I am glad to see that SERAD is expanding our impact in the ME community through our stronger conference presence. In addition, because of last year's success, we will continue to have winners of our annual student paper contest present their peer-reviewed works in dedicated conference sessions in this year's IMECE. Please refer to the student contest information sheet in this newsletter, and don't miss the opportunity to submit your best work by the deadline of 5/28/2019! As usual, the

papers submitted to the divisional contest are peer-reviewed, and winners will be honored with cash honorariums and plaques, as well as reimbursements for conference related expense.

You may or may not know, SERAD has an established long-term partnership with the ASCE-ASME JOURNAL OF RISK AND UNCERTAINTY IN ENGINEERING SYSTEMS. You can find more details regarding the scope and history of this journal and our close partnership in this edition. I am excited to announce that in 2019, the Best Paper Award for Part B: Mechanical Engineering of the Journal will be sponsored by SERAD. The division will present the award during this year's IMECE conference. Stay tuned as we plan out more details for the event!

In April 2019, as planned, SERAD is co-hosting and co-sponsoring an ASME forum/workshop on "Risk Analysis for Autonomous Vehicles, Issues and Future Directions" with the University of Maryland. This event will be followed by a congressional briefing in May. If you are interested, there is still an opportunity to attend this event. Please contact our organizers as indicated in the enclosed flyer. One of the constant themes of our divisional executive meetings has been the continued support and participation from our scientific and engineering community. Dr. Xiaobin Le is our dedicated vice chair for membership and division outreach. Please don't hesitate to reach out to him for any ideas and thoughts to improve our work to help you in your engineering education and career.

Thank you!

INTRODUCTION OF A BOOK ON RISK AND/OR RELIABILITY

Enrico Zio, PhD

Department of Energy, Politecnico di Milano, Italy

Knowledge in Risk Assessment and Management

Terje Aven

Enrico Zio

2018

Featuring contributions by an international team of researchers and respected practitioners in the field, this book explores the latest developments in the ongoing effort to use risk assessment as a means for characterizing knowledge (K) about the system or process of interest.

How should K be described and evaluated in risk assessment? How can it be reflected and taken into account in formulating risk management strategies? With the help of numerous case studies and real-world examples, this book answers these and other critical questions at the heart of modern risk assessment and management.

The book, written by international scholars and leaders in the field:

- Offers a systematic, rigorous and transparent perspective and framework on risk assessment and management, explicitly strengthening the links between knowledge and risk
- Clearly and concisely introduces the key risk concepts at the foundation of risk assessment and management
- Features numerous cases and real-world examples, many of which focused on various engineering applications across an array of industries

Knowledge of Risk Assessment and Management is must-reading for risk assessment and management professionals, as well as graduate students, researchers and educators in the field. It is also of interest to policy makers and business people who are eager to gain a better understanding of the foundations and boundaries of risk assessment, and how its outcomes should be used for decision-making.

New Award!

“Editor’s Award for the Best Paper” for the ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems: Part A. Civil Engineering and Part B. Mechanical Engineering.

The award shall be given annually to one paper in Part A and one paper in Part B appearing in the preceding volume year based on significance and impact (including impact to industry) among others. The selection committee will be appointed by the Editor-in-Chief.

PHYSICS OF FAILURE BASED RELIABILITY ASSESSMENT FOR SYSTEMS EXPOSED TO SLIDING WEAR UNDER UNCERTAINTY

Mohammad Pourmostafaei, M.Sc
Mohammad Pourgol-Mohammad, PhD
Mojtaba Yazdani, PhD
Hossein Salimi, M.Sc
Sahand University of Technology, Iran

Mechanical components, manufacturing tools, and many other engineering systems face failures due to wear with mating parts in relative motion. The overall cost is significantly high and large savings could be achieved with the adoption of design solutions, such as adequate choice of materials, appropriate surface treatments, and scheduled maintenance programs. Wear is a phenomenon related to the gradual loss of material surface in contact bodies due to the friction. Therefore, wear makes surface damage in contact places. This phenomenon causes the formation of fragments (or debris) that leave tribological systems. These two bodies can be in direct contact or separated by a lubricant layer. Wear causes to failure in many systems like bearings, wheel-rail systems, machining tools, etc.

From previous studies, there are some relations that presented wear volume lost with respect to sliding distance. However, these models have issues such as lack of ability to cover both transient and steady-state regimes, low accuracy of determination at these regimes and the physical problem at the beginning of the process.

In this paper, a new model is proposed for system degradation evaluation under sliding wear failure mechanism. This model estimates the material loss with respect to progression of sliding distance. This research is aimed to propose a high accurate wear model with physical and geometrical parameters consideration, which is able to predict the material loss by wear in both stages of sliding wear process. In this model, the material property and physical factors are considered like surface hardness and applied normal load. Several sets of experimental data are used for validation of the presented model. These experimental data are related to the pin-on-disc test including initially conformal and non-conformal contacts. A data set of the pin-on-disc test by ASTM-G99 standard is used for additional model validation. A rail system data is employed for validation of the model in the practical systems. According to the results, it is presented that this model able to predict the amount of wear in two stages, “transient” and “steady-state” with high-level precision in comparison to other previously proposed models. Another advantage of this model is the capability to wear data for two conformal and non-conformal contact conditions. Uncertainty is analyzed by Monte-Carlo simulation to determine the variations of the predicted material loss. After the uncertainty analysis of the model, the results show that the uncertainty of wear volume increases by increasing sliding distance and also by increasing normal load. Finally, the reliability of the systems under wear failure mechanisms

- CONTINUED ON PAGE 8

ASCE-ASME JOURNAL OF RISK AND UNCERTAINTY IN ENGINEERING SYSTEMS, PART A: CIVIL ENGINEERING, PART B: MECHANICAL ENGINEERING

Alba Sofi, PhD

University "Mediterranea" of Reggio Calabria, Italy

Established in 2014 by the current Editor-in-Chief, Professor [Bilal M. Ayyub](#) from the University of Maryland College Park, the [ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering and Part B: Mechanical Engineering](#), serves as a medium for dissemination of research findings, best practices and concerns, and for discussion and debate on risk and uncertainty-related issues in the areas of civil and mechanical engineering and other related fields. The journal addresses risk and uncertainty issues in planning, design, analysis, construction/ manufacturing, operation, utilization, and life-cycle management of existing and new engineering systems.

The journal has been accepted into the Emerging Citation Sources Indexed by Clarivate Analytics, formerly Thomson Reuters, and it is eligible for indexing in 2018. From 2016 onward, all articles will be included in Web of Science. They are also included in Scopus.

CONTENTS

Latest Issues for Part A

[Volume 5-Issue 2](#) (June 2019)

[Volume 5-Issue 1](#) (March 2019)

Latest Issues for Part B

[Volume 5-Issue 1](#) (March 2019)

Table of contents for Part A in 2018

[Volume 4-Issue 4](#) (December 2018)

[Volume 4-Issue 3](#) (September 2018)

[Volume 4-Issue 2](#) (June 2018)

[Volume 4-Issue 1](#) (March 2018)

Table of contents for Part B in 2018

[Volume 4-Issue 4](#) (December 2018)

[Volume 4-Issue 3](#) (September 2018)

[Volume 4-Issue 2](#) (June 2018)

[Volume 4-Issue 1](#) (March 2018)

- CONTINUED ON PAGE 9

Workshop on Risk Analysis for Autonomous Vehicles; Issues and Future Directions

April 26, 2019

Venue: Kay 1-2 Boardrooms, Kim Building of Engineering, University of Maryland, College Park

The World is witnessing remarkable technology advancements and competitions in autonomous and connected transportation vehicles. These include major developments of self-driving electric cars by high tech companies as well as the traditional automobile manufacturers. Urban areas are bracing for a rapid infusion of these technologies into their roads in the near future. While technology development has been the prime focus of most recent technology innovations, we have witnessed only limited advances on issues of risk, reliability, and resilience. A number of accidents have already occurred.

Most surveys show that while the public at large is extremely excited about these technologies, concerns over safety, software reliability, security, hacking/misuse, and licensing remained as paramount.

The objective is to gather the experts from academy, research institutes, and industry to discuss the issues, identify the gaps, and propose the directions for basic and applied research activities.

The conference will follow with a congressional briefing to update the policy makers about the risk of the technology and potential directions for necessary funding.

Workshop topics:

- Risk, reliability and resilience (R3) engineering,
- Communications, information and network security,
- Transportation and road infrastructure,
- Learning and reasoning to control complex behavior
- Legal, ethical and regulatory issues
- Educational programs related to autonomy



Sponsors



Center for Risk and Reliability



Safety Engineering and Risk/Reliability Analysis Division



Ford Motor Company

Co-Organizers

- Professor Mohammad Modarres Centre for Risk and Reliability (CRR), University of Maryland, College Park
modarres@umd.edu
- Dr. Mohammad Pourgol-Mohammad Safety Engineering and Risk/Reliability Division (SER2D)
American Society of Mechanical Engineers (ASME)/Ducted Systems
Johnson Controls Inc.
pourgol-mohadam2@asme.org



2019 Student Paper on Safety Innovation Challenge Contest by the ASME - Safety Engineering, Risk and Reliability Analysis Division (SERAD)

Annually, SERAD hosts a challenge to undergraduate and graduate students to submit papers on Safety Engineering, Risk and Reliability Analysis topics. The papers are peer reviewed by experts in these areas. The top two winning papers in each the undergraduate and graduate groups will be presented in a special SERAD session at the ASME International Mechanical Engineering Congress & Exposition (IMECE) 2019, and honored at a SERAD awards banquet during the conference. Recognitions also include cash honorariums for first place winning authors, and reimbursement with a limit for conference related expense (travel, registration) for all students presenting paper at the special session.

Submitting papers for 2019 SERAD Student Paper Contest:

• Participants:

- Undergraduate and Graduate students
- An academic sponsor/advisor is required

• Important Dates:

- Student paper Submission by **May 28, 2019**.
- SERAD announces 1st and 2nd place winners in respective undergraduate and graduate group **June 25, 2019**.
- Presentation Only Abstract Submission by 1st and 2nd place winners by **TBD**.
- SERAD special session for student contest, and awards banquet in **November 8-14 2019** during IMECE 2019 in Salt Lake City, Utah (actual location, date & time TBD) .

• Submittals:

- Initial submittals must be previously unpublished work, but can be papers used for academic credits.
- Submittals are not required to follow ASME's conference paper format, although it is encouraged. Suggested paper size is 4-6 pages including figures.
- Recommendation and statement of student status from the academic sponsor is required with submission.
- Questions regarding 2019 student contest: Prof. Stephen Ekwaro-Osire (stephen.ekwaro-osier@ttu.edu), Prof. Dengji Zhou (zhoudj@sjtu.edu.cn).



IMECE

International Mechanical Engineering Congress and Exposition

November 08 2019 - November 14 2019, Friday - Thursday

Venue & Location:

Salt Lake City Convention Center
100 S. West Temple
Salt Lake City, Utah , USA

Important Dates:

February 25 2019
Submission of Abstract for Full Papers
March 18 2019
Author Notification of Abstract Acceptance
April 29 2019
Submission of Full-Length Paper

Call for Papers: Track 13 – Safety Engineering, Risk and Reliability Analysis

“Safety Engineering, Risk and Reliability Analysis” is a track for ASME 2019 International Mechanical Engineering Congress and Exposition. We are now to seek for topic organizers to fill following topics. If you are interested in this opportunity, please contact us by email. The Track contains a collection of Topics in the broad area of safety engineering and risk analysis, which are individually organized by leading researchers in the field. The Topics give a comprehensive coverage of experimental, computational, and analytical approaches.

Dengji Zhou Ph.D, Shanghai Jiao Tong University, <zhoudj@sjtu.edu.cn>

Mihai Diaconeasa Ph.D, B. John Garrick Institute for the Risk Sciences, UCLA,
<mihai@risksciences.ucla.edu>

Mohammad Pourgol-Mohammad Ph.D, Johnson Controls Inc./Sahand University of Technology, York, PA, United States, <pourgol-mohamadm2@asme.org>

John Wiechel Ph.D, SEA, Limited, <jwiechel@sealimited.com >

Topic:

1. Reliability Methods.
2. Failure and forensic analysis.
3. Testing for product reliability and safety.
4. Reliability and risk in energy systems.
5. Reliability and risk in manufacture systems.
6. Prognostic and health management.
7. Safety, risk and reliability of emerging technologies.
8. General topics on risk, safety and reliability.
9. Safety in transportation, agriculture, and off-road vehicles.
10. Crashworthiness, occupant protection, and biomechanics.
11. Student contest presentation

Volunteers Needed!

Volunteers are needed to organize the topic, chair the sessions and review the papers. The interested individuals may contact the track organizers.

Researchers and presenters are invited to participate in this event to expand international cooperation, understanding and promotion of efforts and disciplines in the area of Reliability, Safety, and Risk. Dissemination of knowledge by presenting research results, new developments, and novel concepts in Reliability, Safety, and Risk will serve as the foundation upon which the conference program of this area will be developed.

(continued from Page 3)

Physics of Failure Based Reliability Assessment for Systems Exposed to Sliding Wear under Uncertainty

with specified critical wear volume assessed by this model accurately because the uncertainty of predicted values is much lower than other previously presented models. The results show that the rate of variation of reliability has influenced by uncertainty variations.

Call for Papers



ASCE
American Society of Civil Engineers

ASME
SETTING THE STANDARD

ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems: Part A. Civil Engineering and Part B. Mechanical Engineering

More information at <http://www.asce-asme-riskjournal.org/>

Contact Professor Bilal M. Ayyub, Editor in Chief, ba@umd.edu

(continued from Page 4)

ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering, Part B: Mechanical Engineering

RECOGNITIONS AND AWARDS

Part A: Editor's Choice Paper

["Community-Resilience-Based Design of the Built Environment"](#) by Hassan Masoomi and John W. van de Lindt.

Part B: Most Accessed Article in 2018

["How to Take Into Account Model Inaccuracy When Estimating the Uncertainty of the Result of Data Processing"](#) by Vladik Kreinovich, Olga Kosheleva, Andrzej Pownuk and Rodrigo Romero.

Part A: 2017 Outstanding Reviewers

Kash Barker, Eleni Chatzi, Nicholas Chileshe, Yong Li, Iason Papaioannou, Kostas Papakonstantinou, Edoardo Patelli, Xiaohui Qi, Adrian Rodriguez-Marek, Mark Stewart

Part B: Reviewers of the Year 2018

Sifeng Bi, Zhifu Zhu

Best Paper Award

Starting in 2019, the Best Paper Award will be given annually to one paper in Part A and one paper in Part B appearing in the preceding volume year. Currently, papers are being evaluated by the Editorial Board members based on the following criteria: fundamental significance, potential impact, practical relevance to industry, intellectual depth and presentation quality.

CALL FOR PAPERS

Part A: active Calls for Special Collections

Special Collection on ["Risk Analysis Principles for Structural Health Monitoring"](#). Paper submission deadline: July 31, 2019.

Part B: active Calls for Special Issues

Special Issue on ["Uncertainty Management in Complex Multiphysics Structural Dynamics"](#). Paper submission deadline April 30, 2019.

SUBMISSION

Part A: <https://ascelibrary.org/journal/ajrua6>

Part B: <http://risk.asmedigitalcollection.asme.org/journal.aspx>

2018-2019 SERAD LEADERSHIP POSITIONS

Executive Committee Positions 2018-2019

Chair:

Bin Zhou
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1st Vice-Chair:

Jeremy Gernand
jmg64@psu.edu

2nd Vice-Chair-Treasurer:

Mohammad Pourgol-Mohammad
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3rd Vice Chair-Membership:

Xiaobin Le
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4th Vice-Chair-Secretary:

Arun Veeramany
arun.veeramany@pnnl.gov

Past Chair:

Jennifer Cooper
cooperj2@asme.org

Appointed Positions

Nominating Chair:

Open

Student Paper Award Chair:

Stephen Ekwaro-Osire
Dengji Zhou

Newsletter Editors:

Stephen Ekwaro-Osire
Mohammad Pourgol-Mohammad

Webinars/Outreach Chair:

Open

IMECE2019 Chairs:

Dengji Zhou
Mihai Diaconeasa