FORENSIC ENGINEERING 2018

Forging Forensic Frontiers

Proceedings of the Eighth Congress on Forensic Engineering Austin, Texas
November 29–December 2, 2018



EDITED BY Rui Liu, Ph.D., P.E.; Michael P. Lester, P.E.; Alicia E. Díaz de Loóp, P.E. S.E. P.A.; and Michael L. Drorup, P.E. This is a preview. Click here to purchase the full publication.



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PROCEEDINGS OF THE EIGHTH CONGRESS ON FORENSIC ENGINEERING

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SPONSORED BY Forensic Engineering Division of the American Society of Civil Engineers

EDITED BY Rui Liu, Ph.D., P.E. Michael P. Lester, P.E. Alicia E. Díaz de León, P.E., S.E., R.A. Michael J. Drerup, P.E.



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Preface

Forensic Engineering 2018: Forging Forensic Frontiers is a collection of 111 peerreviewed technical papers presented at the Forensic Engineering 8th Congress, sponsored by the Forensic Engineering Division (FED) of the American Society of Civil Engineers (ASCE). The Congress took place from November 30 to December 2, 2018, at the Sheraton Austin Hotel at the Capitol in Austin, Texas. The goals of the Congress were to bring together leading forensic engineering practitioners, researchers, designers, project and construction managers from around the world to allow attendees to learn about current evaluation techniques and investigative methods. These efforts align with the mission of FED to enhance the forensic engineering profession, develop guidelines for conducting failure investigations, disseminate failure information, promote forensic curriculum in engineering education, share practices to reduce failures, and improve performance of the built environment.

Each paper in this collection was subjected to a double-blind review process, with review comments distributed to authors, author revisions as appropriate, and final review by the proceedings editors. Paper submission began with published calls for abstracts and at least two positive indications from reviewers before invitation to submit full papers. The review process determined whether each paper was applicable, useful, and relevant to forensic engineering; whether the paper had been published previously; whether the methodology was satisfactorily explained; whether the references were verifiable, whether the tables, figures, and photographs complemented the paper; whether the conclusions were clear and justified; whether the elements of the paper related logically to the paper; and whether the writing style, grammar, and formatting were appropriate. Each paper received a minimum of two positive reviews in order to be published. Papers in this collection cover a wide array of forensic topics pertaining to the built environment, with some taking new approaches to historic failure events and others exploring new frontiers in forensic evaluation and analysis methods. The Congress also included papers of local and regional interest, such as assessment of damages from recent Hurricanes Irma, Harvey, and Maria.

Two half-day workshops held on November 29, prior to the official start of the Congress, involved guidance in operation of a forensic engineering practice and conducting forensic engineering investigations. These workshops were sponsored by FED Committees on Forensic Practice and Forensic Investigation, respectively. The morning workshop on *The Practice of Forensic Engineering* was presented by James S. Cohen, Leonard J. Morse-Fortier, Clemens J. Rossell, and Lloyd M. Sonenthal.

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The afternoon workshop, *Conducting Failure Investigations*, was presented by Ronald W. Anthony, Richard S. Barrow, Kimball J. Beasley, Jeffrey A. Travis, and Stewart M. Verhulst. The workshop speakers formulated their presentations, in part, on FED sponsored publications <u>Guidelines to Forensic Engineering Practice</u>, 2nd edition, ASCE Press 2012, and <u>Guidelines to Forensic Investigations</u>, 2nd edition, ASCE Press, 2018.

The Congress opened with a featured keynote presentation by accomplished researcher and structural engineer Ahmed Amir Khalil, PhD, P.E. His presentation *High Fidelity Numerical Simulations in Forensic Analysis and Urban Search and Rescue* focused on the use and challenges of high-fidelity numerical modeling in forensic investigations and the use of such to aid in planning for and implementing urban search and rescue operations.

In addition to the presented papers, the Congress also included panel discussions, networking socials, a welcoming reception, an awards luncheon, and committee meetings. Finally, a student paper competition was held that included poster presentations from a number of our future professional forensic engineers.

It has been our pleasure and privilege to be part of this Congress. Happy reading!

Rui Liu, PhD, P.E., M.ASCE Kent State University Proceedings Editor-In-Chief Michael P. Lester, P.E., M. ASCE Element Analytical, PLLC Congress Chair

Acknowledgments

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The guidance, dedication, and commitment of the following individuals contributed to the planning and development of all aspects of the congress venue, program, and activities.

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