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Editorial

Guest Editorial: Special Issue of ESREL2020 PSAM15

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This Special Issue includes seven extended works that have been selected from papers presented at the ESREL 2020 PSAM 15 Conference, the 30th European Safety and Reliability Conference (ESREL 2020) and the 15th Probabilistic Safety Assessment and Management Conference (PSAM 15), jointly held virtually on 1–5 November 2020 to discuss the second wave of the pandemic breakout. In addition to presenting methods for the design and operation of safe and reliable industrial components and systems, and for risk prevention and management in critical infrastructures, the Conference has provided the opportunity to discuss the technical advancements and developments in the field.

The ESREL2020 PSAM15 program included 728 abstracts and papers that were accepted after a peer-review process, conducted by more than 130 Track Directors and 800 reviewers. In addition to 10 plenary lectures, 5 panels, 11 special sessions, and 2 innovation challenges, the program featured 10 plenary lectures by internationally renowned speakers. Fifty-five topics were covered during the Conference works and thirty-one application areas. The specific topics covered in this Special Issue include Cyber Security, External Hazards Risk Assessment, Security, Software Reliability and Safety and Web Security.

The first paper in this Special Issue by Fabrizio Pappalardo, Alberto Moscatello, Gianmario Ledda, Anna Chiara Uggenti, Raffaella Gerboni, Andrea Carpignano, Francesco Di Maio, Riccardo Mereu, and Enrico Zio presents a Quantitative Risk Assessment (QRA) of Oil and Gas installations by Computational Fluid Dynamics (CFD) tools [1]. This work aims to handle a major concern related to the use of CFD tools for simulating accidents. It proposes a way forward for the Uncertainty Quantification of CFD models.

The second paper by Luca Pinciroli, Piero Baraldi, Guido Ballabio, Michele Compare, and Enrico Zio proposes a new deep reinforcement learning based on proximal policy in order to optimize the operation and maintenance of fifty wind turbines in a wind farm over a long period of time. The proposed method finds an optimal O&M policy, which outperforms other competitors when applied [2].

The following paper by Ahmed Shokry, Piero Baraldi, Andrea Castellano, Luigi Serio, and Enrico Zio proposes an intelligent approach for identifying critical components in critical infrastructures. This is a two-step process of feature selection and identification [3].

In the work of Vincenzo Destino, Nicola Pedroni, Roberto Bonifetto, Francesco Di Maio, Laura Savoldi, and Enrico Zio, a three-step methodology is developed for the prompt detection of LOFA precursors [4]. This method firstly generates accident scenarios randomly by Monte Carlo sampling of the failures, then groups the generated scenarios by Spectral Clustering, and finally develops an Online Supervised Spectral Clustering approach in order to associate the evolving parameters.

Oscar Hernán Ramírez-Agudelo, Corinna Köpke, Yann Guillouet, Jan Schäfer-Frey, Evelin Engler, Jennifer Mielniczek, and Frank Sill Torres propose a Bayesian network model to arrange the expert knowledge and incorporate it into a probabilistic model for the sake of evaluating the safety and security of offshore wind farms [5]. It creates a graphical

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probabilistic model, which enables a high-level representation of the safety and security states of the system.

The paper by Lars H. Odsæter, Hans L. Skarsvåg, Eskil Aursand, Federico Ustolin, Gunhild A. Reigstad, and Nicola Paltrinieri presents a theoretical assessment of an accidental spill of cryogen on water, including models for spreading pools, triggering RPTs, and quantifying the consequences [6]. They build a model based on the thermodynamic analysis of the physical processes in order to predict peak pressure and energy yield.

The last paper in the Special Issue is by Zhaojun Hao, Francesco Di Maio, and Enrico Zio, which presents a multi-state model for incorporating the hardware components' stochastic failures with the aging of cyber components, and quantifying the unreliability of cyber-physical energy systems in load-following operations [7].

Finally, we, the guest editors, would like to express our gratitude to the authors and reviewers for their thoughtful and professional contributions. Additionally, we emphasize that without the kind support of the co-editors-in-chief of the journal, this Special Issue would not have been possible; thanks to them, we have been able to put together this collection of such interesting pieces. Our sincere appreciation and gratitude go out to all the above colleagues.

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