

Editorial

Cumulation of Failure and Crack Growth in Materials

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In order to ensure the safety and reliability of materials and structures, for example, in power and energy systems, structural integrity and lifetime prediction are hot topics of research in these systems. For many countries, currently facing a potential future mismatch between energy production and transformation, increasing interest is being paid to new techniques to both discover and understand the failure mechanisms, as well as provide lifetime prediction for engineering materials and structures.

Working structures and their elements are subjected to the influence of various loads. These can be static, cyclic, or dynamic loads. In order to ensure an adequate level of safety and optimal durability of structural elements, experimental tests and simulations are required to determine the effect of various factors. Such factors include the effects of notches, voids, and environment.

Studies and research outcomes carried out in this field are necessary to guide the development of new and advanced standards for a better selection of materials that meet the requirements of the designers.

This issue would aim to provide the data, models, and tools necessary to perform structural integrity and lifetime prediction based on the multiaxial stress state and finally mixed-mode fatigue crack growth resulting in the use of advanced mathematical, numerical, and experimental techniques.

This special issue aims to gather the most recent research achievements on the initiation and growth of cracks in structural components made of different metals and composites. The analysis of mixed modes is of particular interest,

but studies related to the effect of simple load (pure mode conditions) are also well fitted with the aim and scope of the special issue.

Over the last year, we have received and analyzed 28 submitted research works by outstanding international scientists. The papers submitted by the authors have been subjected to the rigorous journal peer-review process. During the intensive process of reviews and in-depth discussions, 17 articles were accepted for the publication, while other documents were rejected (or were withdrawn by the authors) mainly due to the discrepancy to the topic of the special issue. Accepted papers, after passing the positive review process as well as the editorial processes, will be published in this special issue of *Advances in Materials Science and Engineering* entirely devoted to the cumulation of failure and crack growth in materials.

The topics considered in the accepted papers include several aspects influencing the fatigue and fracture of structural materials such as the effects of factors affecting the fatigue life and crack initiation in welded joints, the influence of geometric effects such as notches and fillets, whose investigation has been performed by adopting theoretical, numerical, and experimental approaches. Among the areas emphasized in the special issue are case histories, sample computations of practical design problems, material characterization procedures, failure mechanisms assessment of critical components, energy approach, initiation and propagation mechanisms, effect of microstructure and defects on fatigue behavior, as well as prediction of durability and remaining useful life estimation.

Conflicts of Interest

The editors declare that they have no conflicts of interest regarding the publication of this Special Issue.

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