

Damage mechanisms in materials and structures and numerical analysis in engineering

Preface

Engineering component or structure is often designed to ensure it perform to a given desired function throughout the design life. The deterministic and non-deterministic approach employs nominal or mean quantities when comparing the calculated stresses against the strength of the material, with an intended life. However, the continuous pursuit of numerical analysis in engineering in assessing damage mechanisms in materials and structures is for improved performance with lighter structures and improved desired durability and reliability. In this respect, the knowledge of the response of the materials to the operating load and environment is indispensable for the safe operation of the structures. The mechanical response of the failure consists of two aspects, namely, the damage mechanisms and the application of numerical analysis for assessing this kind of failures. Whereas, numerical analysis has been considered mechanism of the failure which should also be accounted for the desired optimised design. In this respect, the 11th International Conference on Numerical Analysis in Engineering (NAE 2019) and the fourth Symposium on Damage Mechanism in Materials and Structures (SDMMS 2019) was successfully organized to address numerous design-related issues on the response of the materials to the applied load and environment. This special issue of the *International Journal of Structural Integrity* compiles the current technical manuscripts on the method of assessing the damage in the materials, the characterization techniques and sample applications of the analysis to engineering materials and structures. The assessment methods include the traditional analysis, the signal processing, finite element analysis, statistical and probabilistic approaches. Several characterization studies, including stress analysis by computational simulation, limit-load analysis, material performance, ferrous and non-ferrous integrity assessment and fatigue analysis under both constant and variable amplitude loading spectrums are highlighted. Reliability assessment of structures such as the concrete beam, automotive coil spring and the leaf spring is also demonstrated.

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