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*Editorial*

# Special Issue on Fatigue and Fracture of Non-Metallic Materials and Structures

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**Abstract:** This Special Issue covers the broad topic of structural integrity of non-metallic materials, and it is concerned with the modelling, assessment and reliability of structural elements of any scale. In particular, the articles being contained in this issue concentrate on the mechanics of fracture and fatigue in relation to applications to a variety of non-metallic materials, including concrete and cementitious composites, rocks, glass, ceramics, bituminous mixtures, composites, polymers, rubber and soft matters, bones and biological materials, advanced and multifunctional materials.

**Keywords:** Fatigue; Fracture mechanics; Structural integrity; Polymers; Composites; Ceramics; Concrete; Rock; Soft matter; Advanced materials.

## 1. Introduction

The mechanics of fracture and fatigue have produced a huge body of research work in relation to applications to metal materials and structures. However, a variety of non-metallic materials (e.g., concrete and cementitious composites, rocks, glass, ceramics, bituminous mixtures, composites, polymers, rubber and soft matters, bones and biological materials, advanced and multifunctional materials) have received comparatively less attention, despite their attractiveness for a large spectrum of applications related to the components and structures of diverse engineering branches, applied sciences and architecture, and to the load-carrying systems of biological organisms.

This special issue covers the broad topic of structural integrity of non-metallic materials and is is concerned with the modeling, assessment, and reliability of structural elements of any scale. Original contributions from engineers, mechanical materials scientists, computer scientists, physicists, chemists, and mathematicians are presented, following both experimental and theoretical approaches.

## 2. Fracture

A number of papers in this special issue are specifically devoted to fracture mechanics problems. Different approaches have been used, including experimental investigations, theoretical models, and numerical simulations. Papers [1–5] are related to concrete material, from papers [6–12] to rocks. Other contributions investigate the fracture behavior of functionally graded materials [13], glass [14], laminate composites [15], refractories [16], and soft matter [17]. Concrete material is also investigated in relation to impact resistance [18] and self-healing properties [19]. Impact behavior is studied with reference to laminate composites [20,21]. Other papers devoted to rocks concern their cutting resistance [22] and their multiaxial response under dry and saturated conditions [23]. Finally, the mechanical behavior of a monomer structural component is studied in [24].

## 3. Fatigue

Fatigue is investigated from both a experimental and theoretical point-of-view in different papers. In [25–30] in particular, concrete behavior under fatigue loading is described, with an emphasis on

bridge applications [25–27] and concrete reinforced with fibers and rebars [25,29]. Fatigue of asphalt and of rocks is investigated in [31,32], respectively. Finally, an account on fatigue life assessment of wind turbine blades is presented in [33].

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