FRACTURE, DAMAGE AND FAILURE MECHANICS OF CEMENTITIOUS MATERIALS

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Cementitious materials form the backbone of civil engineering infrastructure. Understanding their fracture, damage, and failure mechanisms is vital, especially with the evolving demands of modern design and longevity. With the push for sustainable and resilient infrastructure, understanding cementitious materials at their core becomes paramount. This symposium aims to provide a comprehensive yet concise overview of the present and future of these materials.
The following topics are welcome.

1. Basics of Fracture Mechanics:
Delve into stress, strain, and crack propagation dynamics. Explore Griffith's theory and the practical techniques to measure fracture toughness in cement-based systems.

2. Damage Mechanics:
Differentiate between damage and fracture. Address the evolution of microcracks, influence of material heterogeneity, and the role of additives like aggregates and fibers in the damage process.

3. Multi-Scale Modeling:
Transition from micro to macro perspectives in damage mechanics. Highlight the application of advanced modeling techniques such as FEM and DEM, ensuring material inhomogeneities are incorporated.

4. Environmental Impact:
Discuss the effects of long-term loading, environmental conditions like freeze-thaw cycles, and chemical attacks. Introduce strategies for mitigation.

5. Fiber-Reinforced Concrete (FRC):
Understand the mechanics behind fiber reinforcement. Explore types of fibers (steel, polymer, glass) and FRC performance under varied loads.

6. Self-Healing Concrete:
Discover the promising world of self-healing mechanisms, from autogenous to bacterial methods, and their implications for durability and resilience.

7. Non-Destructive Testing (NDT):
Highlight the significance of early damage detection. Introduce state-of-the-art NDT techniques and their integration with predictive maintenance models.

8. The Future of Cementitious Materials:
Touch upon smart monitoring solutions, sustainable binders, and the increasing role of geopolymers in reducing environmental impact.