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Symmetry and Asymmetry in Materials and Mechanical Engineering: Properties and Applications

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Message from the Guest Editors

Dear Colleagues,

The symmetric and asymmetric characteristics of materials or mechanical design affect the operational performance of mechanical systems. The symmetric and asymmetric properties of materials include symmetry/asymmetry at the atomic, nano-, and micrometer scales, as well as isotropic/anisotropic macroscopic properties. In structural engineering, symmetrical shapes and arrangements are easier to design and manufacture, reducing costs. The performance of mechanical systems is easier to calculate and predict by using symmetrical materials. On the other hand, asymmetry exists extensively in materials and mechanical engineering. For example, the asymmetry of forces can cause stress concentration, posing higher requirements for mechanical design. However, the directed transport of microfluids and heat can be achieved by introducing asymmetry through changing material properties or geometric structures. This Special Issue studies the symmetry and asymmetry characteristics of material and mechanical structure design, as well as related applications. The research method can involve modeling, simulation, machine learning, or experiments.

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Message from the Editor-in-Chief

Symmetry is ultimately the most important concept in natural sciences. It is not surprising then that very basic and fundamental research achievements are related to symmetry. For instance, the Nobel Prize in Physics 1979 (Glashow, Salam, Weinberg) was received for a unified symmetry description of electromagnetic and weak interactions, while the Nobel Prize in Physics 2008 (Nambu, Kobayashi, Maskawa) was received for the discovery of the mechanism of spontaneous breaking of symmetry, including CP symmetry. Our journal is named *Symmetry* and it manifests its fundamental role in nature.

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