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Editorial

Special Issue: Peridynamics and its applications

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Peridynamics (PD) is a new continuum mechanics formulation [1]. It was introduced mainly to overcome the limitations of classical continuum mechanics (CCM). PD uses integro-differential equations to represent equations of material points and equations that do not contain spatial derivatives. This brings an important advantage when analyzing cracks, since the displacement field is not continuous along the crack boundaries and spatial derivatives are not defined there. Moreover, PD formulations are non-local. Material points inside a finite interaction domain, called horizon, can interact with each other without being in physical contact [2]. This provides an opportunity to represent material behavior that cannot be properly defined in CCM. Therefore, it can be a suitable framework for multiscale analysis of materials [3,4]. In addition, PD can also be used for multiphysics analysis of materials and structures. PD formulations for various physical fields are currently available, including thermal [5], moisture diffusion [6], porous flow [7], or fluid flow applications [8]. As opposed to widely used finite element method and semi-analytical approaches [9], PD equations are usually solved numerically based on one meshless approach. To improve computational time, different methods such as dual-horizon peridynamics [10,11] or double-horizon peridynamics [12] can be utilized. Several non-local operators have also been introduced in the literature [13,14].

The aim of this special issue is to provide a platform to present some new advances in peridynamics and its applications. Six journal papers were published as part of this special issue. Lazopoulos et al. [15] presented Λ-fractional peridynamic mechanics, which can be suitable for different topologies and describe various inhomogeneities in various materials with more realistic rules. In another study, Lazopoulos and Lazopoulos [16] considered the Λ-fractional beam bending problem by allowing elastic curves with non-smooth curvatures. Friebertshäuser et al. [17] used a continuum kinematics–based peridynamics approach to investigate dynamic fracture including impact damage and crack initiation. Altenbach et al. [18] compared CCM and PD models for the structural analysis of a monolithic glass plate subjected to ball drop. A comprehensive review of recent advances in peridynamic theory was given by Oterkus and Oterkus [19]. Finally, Ramadan [20] presented multi-objective optimization and numerical simulations to optimize the shear strength of a reinforced concrete T beam.

Use of AI tools declaration

The authors declare they have not used Artificial Intelligence (AI) tools in the creation of this article.

Conflict of interest

Erkan Oterkus, Timon Rabczuk and Selda Oterkus are on a special issue editorial board for *AIMS Materials Science* and were not involved in the editorial review or the decision to publish this article. All authors declare that there are no competing interests.

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