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Editorial

Advances in General Topology and Its Application

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In recent years, mathematical and, in particular, topological models and methods have been used extensively in real-world problems related to economics, engineering, biology, computer science, medical science, social science, etc. Our aim is to present and describe part of the important role of general topology for these purposes.

This Special Issue "Advances in General Topology and Its Application" contains 10 papers published in the journal *Axioms*. The papers cover several areas of general topology, present new results in this area and demonstrate various applications of topological ideas, methods and techniques in a variety of mathematical and scientific disciplines. We hope that this issue will stimulate researchers working on general topology and its applications.

Below we describe the results obtained in each of the 10 mentioned papers.

In paper [1], the notions of s-ω-paracompactness and feebly ω-paracompactness (as a weaker form of ω-paracompactness) are introduced and their properties are studied. Every locally countable topological space is feebly ω-paracompact, and every countably ω-paracompact and σ-ω-paracompact space is ω-paracompact. ω-paracompactness and σ-ω-paracompactness are inverse invariants under perfect mappings with countable fibers. A sum theorem for ω-paracompact normal topological spaces is obtained.

The author of paper [2] considers a variational–hemivariational inequality in a real Hilbert space depending on two parameters. By using the theory of maximal monotone operators, the fixed point arguments and properties of the subdifferential (in the sense of Clarke and convex analysis) and various existence, uniqueness and equivalence results for the solution of elliptic and history-dependent variational–hemivariational inequalities are obtained. Some iterative methods for solving these inequalities are presented.

The study of the behavior of a system often requires working with uncertainties and incomplete data. In 1999, the concept of soft sets was proposed by D. Molotsov as a new mathematical tool to deal with uncertainty. Later on, an application of soft set theory to a decision-making problem was described, and the notion of soft sets was employed to define soft topological spaces. Paper [3] deals with soft generalized ω-closed sets which are a common generalization of soft ω-closed sets and soft generalized closed sets. The classes of generalized closed sets and generalized ω-closed sets coincide in the class of soft anti-locally countable soft topological spaces, while in the class of soft locally countable topological spaces, every soft set is a soft generalized ω-closed set. Two new characterizations of soft $T_{1/2}$ spaces are obtained.

In recent years, many authors have studied the behavior of different topological and geometric properties under the influence of certain functors. Paper [4] is devoted to such an investigation for some cardinal invariants (hereditary density, hereditary weak density and hereditary Lindelöf number) and the functor of permutation degree. The relation between the spread and the extent of the space $SP^2(\mathbb{R}, \tau(A))$ of the permutation degree of a Hattori space is established. Furthermore, it is shown that if the spaces X and Y are homotopically equivalent, then the spaces $SP^n X$ and $SP^n Y$ are also homotopically equivalent, i.e., SP^n is a covariant homotopy functor.

Article [5] concerns a recently introduced binary metric as a symmetric, distributive-lattice-ordered σ-valued function of two variables satisfying a "triangle inequality". The strong convergence of sequences in binary metric spaces is introduced and it is shown that a strong convergence implies convergence. Under certain conditions, these two kinds of convergence coincide. String complete binary metric spaces are defined and the strong completion of a binary metric space is described.

In [6], the author extends a sigma-set algebraic structure in a Hausdorff topological space based on locally compactable neighborhood systems. The concepts of symmetric signed measures, uniformly pushforward measures and their interval-valued Lebesgue varieties within a topological measure space are introduced and a comparative analysis of the proposed concepts with respect to existing results is presented. It is proven that symmetric signed measures preserve total ordering on the real line. Locally constant measures in compact supports in sigma-neighborhood systems are invariant under topological deformation retraction in a simply connected space. Haar measurable group algebraic structures equivalent to additive integer groups arise under locally constant and signed measures.

Paper [7] is devoted to an application of wt-distance in a b-metric framework. The author generalizes the b-metric version (given by Czerwik) of the famous Matkowski fixed-point theorem by replacing the b-metric with any wt-distance in the corresponding complete b-metric space. This result allows the derivation of characterizations of complete b-metric spaces (as generalizations of characterizations of metric completeness).

In [8], three types of functions (lower and upper semi-continuous functions and cliquish functions) in a generalized topological space are considered. A characterization of cliquish functions in terms of nowhere dense sets is given, and some results for nowhere dense sets and second category sets are obtained.

Paper [9] investigates the properties related to the recently introduced finite coarse-shape invariants (the k-th finite coarse-shape group of a pointed topological space and the k-th relative finite coarse-shape group of a pointed topological pair). The authors show that finite coarse-shape groups generally differ from both shape and coarse-shape groups. A pointed pair of metric continua whose finite coarse-shape group sequence fails to be exact is also constructed.

In the last tree decades, the theory of star selection principles, as a subfield of the fields of selection principles and star covering properties, has led to a number of research works and is one of the most rapidly growing areas within topology. Paper [10] reviews the up-to-date results in the field of star selection principles. Several new directions for possible investigations are also presented and discussed.

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