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Some properties of soft topological spaces

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ABSTRACT

For dealing with uncertainty researchers introduced the concept of soft sets. Shabir and Naz (2011) [28], defined several basic notions on soft topology and studied many properties. In this paper, we continue investigating the properties of soft open (closed), soft nbd and soft closure. We also define and discuss the properties of soft interior, soft exterior and soft boundary which are fundamental for further research on soft topology and will strengthen the foundations of the theory of soft topological spaces.

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1. Introduction

Several theories, such as the theory of fuzzy sets [1], theory of intuitionists fuzzy sets [2], theory of vague sets, theory of interval mathematics [3], theory of rough sets and theory of probability [4,5] can be considered as mathematical tools for dealing with uncertainties. These theories have inherent difficulties due to the inadequacy of the parameterization tool of the theories as pointed out by Molodtsov.

In 1999 Molodtsov [6] initiated the theory of soft sets as a new mathematical tool to deal with uncertainties while modeling problems in engineering physics, computer science, economics, social sciences and medical sciences.

In [7], Molodtsov applied successfully in directions such as, smoothness of functions, game theory, operations research, Riemann-integration, Perron integration, probability and theory of measurement. Maji et al. [8,9] gave the first practical application of soft sets in decision making problems. In 2003, Maji et al. [9] defined and studied several basic notions of soft set theory. In 2005, Pei and Miao [10] and Chen [11] improved the work of Maji et al. [8,9].

Many researchers have contributed towards the algebraic structure of soft set theory [12–25]. The application of soft set theory in algebraic structures was introduced by Aktas and Cagman [13]. They established the basic notions of soft groups as a generalization of the idea of fuzzy groups. Jun [16] investigated BCK/BCI-algebras and their applications in ideal theory. Feng et al. [14] worked on soft semirings, soft ideals and idealistic soft semirings. Ali et al. [26], Shabir and Ali [27] studied semigroups and soft ideals over a semigroup which characterized generalized fuzzy ideals and fuzzy ideals with thresholds of a semigroup.

Recently, in 2011, Shabir and Naz [28] initiated the study of soft topological spaces. They defined soft topology on the collection τ of soft sets over X. Consequently, they defined basic notions of soft topological spaces such as soft open and

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