

A NOTE ON SOME NEW INTERVAL-VALUED OPEN SETS IN TOPOLOGICAL SPACES

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Abstract: The purpose of this paper is to introduce and study several new classes of interval-valued open sets in topological spaces. In particular, the notions of interval-valued $\hat{S}$ -open sets, interval-valued semi-regular sets, and interval-valued $\mathcal{Q}$ -closed sets are defined and investigated. Fundamental properties of these newly defined sets are examined and their relationships with existing types of open and closed sets are discussed. Characterizations and basic results concerning these sets are established. Several implications between interval-valued $\hat{S}$ -open sets, interval-valued semi-regular sets, and interval-valued $\mathcal{Q}$ -closed sets are obtained. The behavior of these sets under set-theoretic operations such as union and intersection is analyzed. Moreover, examples are provided to illustrate the concepts and to show the independence of certain properties. The results obtained extend and generalize some known results in the literature. These investigations contribute to the development of generalized open set theory in topology. The study may also provide a foundation for further research in related topological structures.

Keywords and Phrases: $\mathcal{IV}\hat{S}$ -open, $\mathcal{IV}s$ -regular and $\mathcal{IV}\mathcal{Q}$ -closed.

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1. Introduction

The notion of interval sets, originally introduced by Yao [6], offers a useful approach for representing and approximating uncertain or complex concepts. Subsequently, Kim et al. [4] described this framework using the term interval-valued