On (Semi) Topological BCC-algebras

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Abstract

In this paper, we introduce the notion of (semi) topological BCC-algebras and derive here conditions that imply a BCC-algebra to be a (semi) topological BCC-algebra. We prove that for each cardinal number α there is at least a (semi) topological BCC-algebra of order α. Also we study separation axioms on (semi) topological BCC-algebras and show that for any infinite cardinal number α there is a Hausdorff (semi) topological BCC-algebra of order α with nontrivial topology.

Keywords: BCC-algebra, (semi)topological BCC-algebra, ideal, preideal, Hausdorff space, Uryshon space
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1 Introduction

In 1966, Y. Imai and K. Iséki in [6] introduced a class of algebras of type $(2, 0)$ called BCK-algebras which generalizes on one hand the notion of algebra of sets whit the set subtraction as the only fundamental non-nullary operation, on the other hand the notion of impliction algebra. K. Iséki posed an interesting problem whether the class of BCK-algebras form a variety. In connection with this problem Y. Komori in [7] introduced a notion of BCC-algebras which is a generalization of notion BCK-algebras and proved that class of all BCC-algebras is not a variety. W. A. Dudek in [5] redefined the notion of BCC-algebras by using a dual form of the ordinary definition. Further study of BCC-algebras was continued [5]. In recent years some mathematicians have endowed algebraic structures associated with logical systems with a topology and have studied some their propertises. For example, Borzooei et.al in [2] introduced (semi) topological BL-algebras and in [3] and [4] studied metrizability and separation axioms on them. In [8] Kouhestani and Borzooei introduced (semi) topological residuated lattices and studied separation axioms T_0, T_1, and T_2 on them. In this paper, in section 3 we will define (left, right, semi) topological BCC-algebras and show that for each cardinal number α there is at least a topological BCC-algebra of order α. In section 4, we study some topological results on BCC-algebras endowed with a topology. In section 5, we will study connection between (semi) topological BCC-algebras and T_i spaces, when $i = 0, 1, 2$. We prove that for any infinte cardinal number α there is Hausdorff topological BCC-algebra of order α which its topology is non trivial.

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