

ATANASSOV'S INTUITIONISTIC FUZZY TRANSLATIONS OF  
INTUITIONISTIC FUZZY SUBALGEBRAS AND IDEALS  
IN  $BCK/BCI$ -ALGEBRAS

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**Abstract.** In this paper, the concepts of intuitionistic fuzzy translation to intuitionistic fuzzy subalgebras and ideals in  $BCK/BCI$ -algebras are introduced. The notion of intuitionistic fuzzy extensions and intuitionistic fuzzy multiplications of intuitionistic fuzzy subalgebras and ideals are introduced and several related properties are investigated. In this paper, the relationships between intuitionistic fuzzy translations and intuitionistic fuzzy extensions of intuitionistic fuzzy subalgebras and ideals are investigated.

## 1 Introduction

There exist two different intuitionistic fuzzy sets theories introduced by Atanassov (1983) and Takuti-Titani (1984), see [7, 8] and [34, 35]. Their common name was borrowed from intuitionistic logic which was well-established long before the above mentioned publications by Atanassov and Takeuti-Titani. But the essential difference is that Takeuti-Titani's intuitionistic fuzzy set theory [34] is developed within the scope of intuitionistic mathematics, while Atanassov's intuitionistic fuzzy sets theory is based upon different principles. The term "intuitionistic" in the paper is used only in Atanassov's sense.

The theory of intuitionistic fuzzy set is expected to play an important role in modern mathematics in general as it represents a generalization of fuzzy set. The notion of intuitionistic fuzzy set was defined by Atanassov [4, 5]. Then, several papers have been published by mathematicians to extend the classical mathematical concepts and fuzzy mathematical concepts to the case of intuitionistic fuzzy mathematics, for example see [1, 2, 9, 10, 11, 12, 13, 14, 16, 37].

The notion of  $BCK$ -algebras was proposed by Imai and Iseki [18] in 1966. In the same year, Iseki [19] introduced the notion of a  $BCI$ -algebra which is a generalization of a  $BCK$ -algebra. For the general development of  $BCK/BCI$ -algebras, the ideal theory plays an important role. In 1991, Xi [36] applied the concept of fuzzy sets to  $BCK$ -algebras. In 1993, Jun [23] and Ahmad [3] applied it to  $BCI$ -algebras. After that

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