Semirings Embedded in a Completely Regular Semiring

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Abstract

Recently, we have shown that a semiring \( S \) is completely regular if and only if \( S \) is a union of skew-rings. In this paper we show that a semiring \( S \) satisfying \( a^2 = na \) can be embedded in a completely regular semiring if and only if \( S \) is additive separative.

Key words: Completely regular semiring, skew-ring, b-lattice, archimedean semiring, additive separative semiring.

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1 Introduction

Recall that a semiring \((S, +, \cdot)\) is a type \((2,2)\) algebra whose semigroup reducts \((S, +)\) and \((S, \cdot)\) are connected by ring like distributivity, that is,

\[ a(b + c) = ab + ac \quad \text{and} \quad (b + c)a = ba + ca \]

for all \( a, b, c \in S \). A semiring \((S, +, \cdot)\) is called a Boolean semiring if \( a^2 = a \) for all \( a \in S \). A semiring \( S \) is called additive cancellative if the additive reduct \((S, +)\) is a cancellative semigroup, i.e., for \( a, b, c \in S \), \( a + b = a + c \) implies \( b = c \).

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