

# Semirings Embedded in a Completely Regular Semiring<sup>\*</sup>

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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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