Acta Math. Hungar., **154** (**2**) (2018), 470–479
https://doi.org/10.1007/s10474-018-0786-y
First published online January 22, 2018

ON DECOMPOSITIONS OF SEMIRINGS VIA k-RADICALS OF SOME RELATIONS

A. K. BHUNIYA[1,*] and T. K. MONDAL[2]

[1]Department of Mathematics, Visva-Bharati University, Santiniketan, Bolpur-731235, West Bengal, India
e-mail: anjankbhuniya@gmail.com

[2]Department of Mathematics, Dr. Bhupendranath Dutta Smriti Mahavidyalaya, Hatgobindapur, Burdwan-713407, West Bengal, India
e-mail: tapumondal@gmail.com

(Received September 11, 2017; revised November 13, 2017; accepted November 20, 2017)

Abstract. We generalize the notion of k-radical of Green's $\overline{\mathcal{J}}$-relation, study the decompositions of semirings and investigate the semirings on which the powers and transitive closures of k-radicals are distributive lattice congruences.

1. Introduction

The notion of semirings was introduced by Vandiver [6]. Initially, semirings appeared in mathematics as the semiring of all ideals of a ring, the semiring of all endomorphisms on a commutative semigroup, the positive cone in ordered ring, etc. While studying the structure of semigroups, A. H. Clifford [3] first introduced the semilattice decompositions of semigroups. The idea consists of decomposing a given semigroup S into subsemigroups, through a congruence η on S such that S/η is the greatest semilattice homomorphic image of S and each η-class is a component subsemigroup.

In [1], the authors studied the structure of semirings, and the analogue of semilattice decomposition was studied in semirings, whereby a description of the least distributive lattice congruence on a semiring S in $\mathcal{SL}^+$ was provided. In [5], the authors introduced the notion of k-radical of Green's relation and studied the structure of semirings via the same. The authors, in [2], continued the work and constructed the least distributive lattice congruence on a semiring S in three different ways, and characterized the semirings

* Corresponding author.

Key words and phrases: k-radical, distributive lattice congruence, transitive closure, k-Archimedean semiring, distributive lattice of k-Archimedean semirings.

Mathematics Subject Classification: 16Y60.