Ganitha Darpanam (Volume-1, A.Y 2023-24)
(Mirror of Mathematics)
Dept. of Mathematics :: Bapatla Engineering College
Available at http://becbapatla.ac.in/maths

16.On Coaxial Filters of Almost Distributive Lattices

By

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In 1854, George Boole introduced the two-valued propositional calculus, which formed the foundation of Boolean algebra. This initial work led to the discovery of various related algebraic structures. Notable among these are regular rings, introduced by Von Neumann in 1936; p-rings, studied by McCoy and Montgomery in 1937; and associate rings, explored by Sussman in 1958. Later, in 1963, Subrahmanyam developed the concept of triple systems, a lattice-theoretic extension of p_1-rings. One key insight was that the additive semigroup structure in triple systems often does not influence their primary results. Motivated by these developments, Maddana Swamy and Rao proposed the theory of almost distributive lattices (ADLs) and introduced the concept of ideals within this structure. These ideals, analogous to those in distributive lattices, led to the observation that the set of all principal ideals, PI(L), forms a distributive lattice. This realization enabled the application of many established lattice-theoretic principles to the study of ADLs.

In 2018, Rafi and Ravi Kumar further investigated the structural properties of ADLs, focusing on dual annihilators, dual annihilator filters, and μ-filters. Introduced the notions of coaxial filters and strongly coaxial filters, defined in terms of dual annihilators, and utilized these to characterize dually normal ADLs by examining their connection with maximal ideals. Their study provided equivalent conditions for an ADL filter to qualify as a coaxial filter and introduced the concept of normal prime filters, showing that such filters are both coaxial and minimal prime filters. Additional properties of coaxial filters were examined, particularly their behavior under inverse homomorphic images and Cartesian products. The researchers also introduced the concept of weakly dually normal ADLs, identifying specific criteria under which these could be considered dually normal. They derived equivalent conditions for an ADL filter to become a strongly coaxial filter and demonstrated that, under certain conditions, the set of all strongly coaxial filters in an ADL forms a sublattice within the filter lattice.

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