1154-06-2234 **Natanael Alpay*** (alpay100@mail.chapman.edu), Chapman University, 1 University Drive, Orange, CA 92866, and **Peter Jipsen** (jipsen@chapman.edu), Chapman University.

*Commutative doubly-idempotent semirings determined by chains and by preorder forests.*

A *commutative doubly-idempotent semiring* (*cdi-semiring*) $(A, \vee, \cdot, 0, 1)$ is a semilattice $(A, \vee, 0)$ with $x \vee 0 = 0$ and a semilattices $(A, \cdot, 1)$ with identity 1 such that $x0 = 0$, and $x(y \vee z) = xy \vee xz$ holds forall $x, y, z \in A$. Bounded distributive lattices are cdi-semirings that satisfy $xy = x \wedge y$, and the variety of cdi-semirings covers the variety of distributive lattices.

We construct all cdi-semirings for which their multiplicative semilattice is a chain with $n$ elements, and we show that up to isomorphism the number of such algebras is the $n{-}1^{\text{th}}$ Catalan number $C_{n-1} = \frac{1}{n}\binom{2n-2}{n-1}$. We also show that cdi-semirings with a complete atomic Boolean $\vee$-semilattice on the set of atoms $A$ are determined by rooted preorder forests on the set $A$.

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