
GENERATING RIORDAN MATRICES VIA HIGHER-ORDER RECURRENCES

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ABSTRACT

The Riordan group, denoted by R , is a set of infinite lower-triangular matrices defined by a pair of formal power series $(g(t), f(t))$ such that $g(0) \neq 0$, $f(0) = 0$, and $f'(0) \neq 0$. The generic element $T = (d_{n,k})_{n,k \geq 0}$ of the matrix is given by the property that the generating function of its k -th column is $g(t)(f(t))^k$. In this study, we establish explicit Riordan representations for a class of Riordan matrices generated by number sequences satisfying higher-order recurrence relations. Utilizing these algebraic representations, we investigate the fundamental combinatorial properties inherent in the structure of these matrices. Furthermore, we examine various row sum characteristics and derive explicit algebraic formulas for specific row sums.

Keywords Riordan group, · Formal power series · Higher-order recurrence relation, · Combinatorial identities, · Row sums

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