General form of the solutions of some difference equations via Lie symmetry analysis

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Abstract. In this paper, we obtain exact solutions of the following rational difference equation

$$x_{n+1} = \frac{x_n x_{n-2} x_{n-4}}{x_{n-1} x_{n-3}(a_n + b_n x_n x_{n-2} x_{n-4})},$$

where a_n and b_n are random real sequences, by using the technique of Lie symmetry analysis. Moreover, we discuss the periodic nature and behavior of solutions for some special cases. This work is a generalization of some works by Elsayed and Ibrahim in the literature.

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