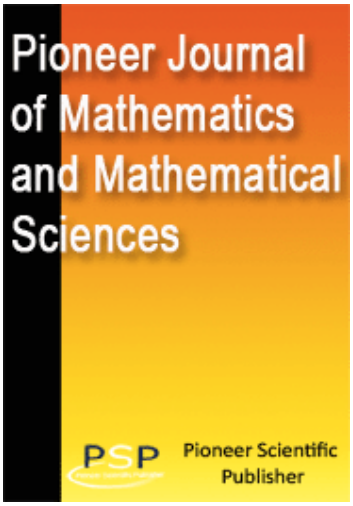
Pioneer Journal of Mathematics and Mathematical Sciences
Volume 39, Issues 1-2, Pages 29-47 (September & November 2023)
ISSN: 2230-9829



THE SCHRÖDINGER FORM AND THE DISCRETE SHEFFER SEQUENCES

D. J. Galiffa, L. J. Minner, D. J. Shaffer and J. K. Ulrich

Received December 31, 2021

Abstract

In this paper, we develop a discrete analogue of the one-dimensional time-independent Schrödinger equation through the theory of classical discrete orthogonal polynomial sequences. We first establish this difference equation in a general context and then obtain specific solutions involving each of the discrete Sheffer sequences (the Meixner, Charlier and Krawtchouk polynomials). In turn, we also develop a first-order difference equation for each of these polynomials; the derivation of the latter two does not appear in the literature. We then supplement our analysis by graphing several solutions to our Schrödinger equation and conclude our work with some future directions.

Keywords and phrases: *A*-Type 0, difference equations, discrete Schrödinger equation, orthogonal polynomials, Schrödinger equation, Sheffer sequences.