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Recurrence coefficients for discrete orthogonal polynomials with hypergeometric weight and discrete Painlevé equations.

Over the last decade it became clear that the role of discrete Painlevé equations in applications is steadily growing. Thus, the question of recognizing some non-autonomous recurrence as a discrete Painlevé equation and understanding its place in Sakai's classification scheme, determining whether it is equivalent to some known (model) example, and especially finding an explicit change of coordinates transforming it to such example, is one of the central ones. Fortunately, Sakai's geometric theory provides an almost algorithmic procedure of answering this question. We illustrate this procedure by studying an example coming from the theory of discrete orthogonal polynomials. There are many connections between orthogonal polynomials and Painlevé equations, both differential and discrete. In particular, often the coefficients of three-term recurrence relations for orthogonal polynomials can be expressed in terms of solutions of some discrete Painlevé equation. In this work we study orthogonal polynomials with general hypergeometric weight and show that their recurrence coefficients satisfy, after some change of variables, the standard discrete Painlevé-V equation. We also provide an explicit change of variables transforming this equation to the standard form. (Received September 16, 2019)