Sobolev orthogonal polynomials on the triangle

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Abstract: In [1], Yuan Xu generalized the standard bases of orthogonal polynomials on the triangle for negative values of the parameters and he showed Sobolev orthogonality for these polynomials. The purpose of this work is to analyze another family of mutually orthogonal polynomials on the triangle with respect to an inner product which involves some derivatives on one side of it. These polynomials are related with some Christoffel–Darboux transformation of one of the three term recurrence relations that polynomials on the triangle satisfy. Some algebraic and analytic properties will be deduced.

[1] Y. Xu, Approximation and orthogonality in Sobolev spaces on a triangle. *Constr. Approx.* **46** (2017) 349–434.