The paper describes (theory and implementation in Maple) three algorithms for \(q\)-hypergeometric summation. The first one is a multibasic analogue of Gosper’s algorithm. The second is a \(q\)-Zeilberger type algorithm. The third one is designed to find \(q\)-hypergeometric solutions of linear recurrences. Applications to \(q\)-analogous of classical orthogonal polynomials are also presented. For example the connection coefficients between families of \(q\)-Askey-Wilson polynomials are computed. The Maple package is the first one which combines all the algorithms which are useful tools to deal with problems associated with \(q\)-hypergeometric series.

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Keywords : hypergeometric solutions of linear recurrence; \(q\)-series; Gosper and Zeilberger algorithms; Maple; \(q\)-Askey-Wilson polynomials; \(q\)-hypergeometric series

Classification:

- 65D20 Computation of special functions
- 33D45 Basic hypergeometric functions and integrals in several variables
- 68W30 Symbolic computation and algebraic computation
- 33F10 Symbolic computation of special functions
- 33D15 Basic hypergeometric functions of one variable