The well-known multiple hypergeometric series are all solutions to canonical systems of partial differential equations, which can be written in many forms. For the $q$-case, the canonical systems of partial $q$-difference equations have corresponding solutions multiple $q$-hypergeometric series [1]. These solutions are only valid near the origin and can be extended by analytic and meromorphic continuation. In order to explain the extended convergence regions for these multiple $q$-hypergeometric series, which consist of a rhombus and an octahedron [2], etc. we have to introduce so-called $q$-real numbers [3]. Finally, we shall introduce a new $q$-Laplace transform for a Jackson $q$-integral $\int_0^a f(t, q) \, dq(t)$, with upper integration limit $\frac{1}{s(1-q)}$.

We shall conclude with a list of $q$-Laplace transforms for (multiple) $q$-hypergeometric series, some with function arguments so-called $q$-real numbers.

References

