Abstract:
We introduce discrete fractional sum equations and inequalities. We obtain the equivalence of an initial value problem for a discrete fractional equation and a discrete fractional sum equation. Then we give an explicit solution to the linear discrete fractional sum equation. This allows us to state and prove an analogue of Gronwall's inequality on discrete fractional calculus. We employ a nabla, or backward difference; we employ the Riemann-Liouville definition of the fractional difference. As a result, we obtain Gronwall's inequality for discrete calculus with the nabla operator. We illustrate our results with an application that gives continuous dependence of solutions of initial value problems on initial conditions.