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9. Ordinary Differential Equations and Dynamical Systems

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Comparison theorems for the asymptotic behavior of solutions of difference equations

In this paper we consider the asymptotic behavior of solutions of the nonlinear difference equation

$$(E) \qquad \Delta^m y(n) + f(n, y(n), y(n+1), \ldots, y(n+m-1)) = b(n),$$

where $m \geq 2$, $n \in N_0 = \{n_0, n_0+1, \ldots\}$, $b : N_{n_0} \to R$ and $f : N_{n_0} \times R^m \to R$.

The our purpose is to reduce the problem of asymptotically equivalent solutions of difference equation of higher order to the boundedness of solutions of some difference equation of first order. In consequence, our conditions imposed on the function f are less restrictive than those previously required by other authors. Part of these results is joint work with J. Werbowski.