

**Global exponential stability criterion for a general system of
difference equations with unbounded delays and applications to
discrete-time neural network models**

José J. Oliveira

Departamento de Matemática and CMAT, Escola de Ciências,
Universidade do Minho, Campus de Gualtar, 4710-057 Braga, Portugal
e-mail: jjoliveira@math.uminho.pt

Abstract

In this presentation, first, a discretization process is described to obtain a discrete-time neural network model from a continuous-time neural network model. Then a phase space for a multidimensional nonautonomous general system with unbounded delays is presented and an exponential stability criterion of its zero solution is given. Based on the M-matrix theory, we establish sufficient conditions to ensure the global exponential stability of the zero equilibrium of low-order, and high-order, discrete-time Hopfield neural network models with unbounded delays and delay in the leakage terms.