

# Sharp Conditions for Global Stability of Lotka-Volterra Systems with Distributed Delays

Teresa Faria

Departamento de Matemática and CMAF, Faculdade de Ciências,  
Universidade de Lisboa, Campo Grande, 1749-016 Lisboa, Portugal  
e-mail: tfaria@ptmat.fc.ul.pt

## Abstract

We give a criterion for the global attractivity of a positive equilibrium of  $n$ -dimensional non-autonomous Lotka-Volterra systems with distributed delays. For a class of autonomous Lotka-Volterra systems, we show that such a criterion is sharp, in the sense that it provides necessary and sufficient conditions for the global asymptotic stability independently of the choice of the delay functions. The global attractivity of positive equilibria is established by imposing a diagonal dominance of the instantaneous negative feedback terms, and relies on auxiliary results showing the boundedness of all positive solutions. The paper improves and generalizes known results in the literature, namely by considering systems with distributed delays rather than discrete delays.

*Keywords:* Lotka-Volterra system, delayed population model, distributed delay, global asymptotic stability, instantaneous negative feedback.

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