Mathematical Methods for Ecology and Industrial Management

ICMAT
INSTITUTO DE CIENCIAS MATEMÁTICAS

Seminar
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ICMAT, Aula Naranja

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Analytic Left Inversion of SISO Lotka-Volterra Models

A classical population model is the Lotka-Volterra system, which can be viewed as a nonlinear input-output system where time-varying parameters are taken as inputs and the population levels are the outputs. If some of these inputs can be actuated, this sets up an open-loop control problem where a certain population profile as a function of time is desired, and the objective is to determine suitable system inputs to produce this profile. Mathematically, this is a left inversion problem. In this talk, this inversion problem is solved analytically using known methods based on combinatorial Hopf algebras. The focus is on the simplest case, two species models and single-input, single-output (SISO) systems.