

# **Optimal management and spatial pattern formation in a distributed shallow lake model**

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Abstract

We present a framework to numerically treat spatially distributed optimal control problems over an infinite time horizon. The basic idea is to consider the associated canonical system in two steps. First we perform a bifurcation analysis of the steady state canonical system using the continuation and bifurcation package (pde2path, MatCont). This often yields so called Flat Optimal Steady States (FOSS) and patterned or Heterogeneous Optimal Steady States (HOSS). In a second step we link these results to two point boundary value problem solvers (OCMat) to study optimal time dependent paths to steady states. As an example we consider a shallow lake model with diffusion.