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Optimal control of groundwater pollution: theoretical and numerical results

Éloïse Comte

Complex Systems Lab, INRAE (French National Research Institute for Agriculture, Food and Environment), Clermont-Ferrand, France

eloise.comte@inrae.fr

Abstract

An optimal control problem of groundwater pollution is considered. The spatio-temporal objective takes into account the trade-off between pollutant use and environmental damages. It is constrained by a system of parabolic and elliptic PDEs, non linearly coupled through the convection term and the dispersion tensor. We present theoretical results, in particular we study a case of low concentrations in order to prove the uniqueness of the solution by using asymptotic analysis. We also introduce a competition between two polluters and we prove the existence and the uniqueness of a Nash equilibrium. Finally, some numerical results are provided.

[1] E. Augeraud-Véron, C. Choquet, É. Comte and M. M. Diédhiou, A game theory approach for the groundwater pollution control. *SIAM Journal on Control and Optimization*, 60(3), 2022.

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