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Optimal Control of Nonlinear Parabolic Systems: Theory ...

In this section, we discuss the distributed optimal control of the parabolic–elliptic system and prove the existence of an optimal solution based on the Lions theory. Let us have a control ⊡ ⊡ L 2 (Q 0) ; we study the following problem: (P) { min J (u , ⊡) = 1 2 ⊡ u ⊡ u d ⊡ S 2 + ⊡ 2 ⊡ ⊡ ⊡ L

2 (Q 0) 2 s.t. u t + (f (t , x , u)) x + g (t , x , u) + P x ⩽ (a (t , x) u x) x = h + B ⩾ ⩾ , ⩾ P x x + P = h (t , x , u , u x) + k (t , x , u) u | t = 0 ...

Optimal control of a nonlinear parabolic⎕elliptic system ...

OPTIMAL CONTROL PROBLEM FOR SYSTEMS GOVERNED BY NONLINEAR PARABOLIC EQUATIONS WITHOUT INITIAL CONDITIONS An optimal control problem for systems described by Fourier problem for nonlinear parabolic equations is studied. Control functions occur in the coefficients of the state equations. The existence of the optimal control in the case of final observation is proved.

OPTIMAL CONTROL PROBLEM FOR SYSTEMS GOVERNED BY NONLINEAR ...

This paper considers optimal problems for boundary control systems with the control acting through a general nonlinear boundary condition. The problems include constraints on the control and target conditions. The final result is a version of Pontryagin⎕s maximum principle. This setup covers such physical situations as Stefan⎕Boltzmannboundary conditions, and is based on an abstract theory ...

Optimal Problems for Nonlinear Parabolic Boundary Control ...

(2004) Optimal control of the heat equation in an inhomogeneous body. Journal of Applied Mathematics and Computing 15 :1-2, 127-146. (1995) OPTIMIZATION IN A NONLINEAR PARABOLIC SYSTEM WITH A CONTROL IN THE COEFFICIENTS.

Nonlinear Optimal Control Problems for Parabolic Equations ...

Optimal control problems of nonlinear degenerate parabolic differential systems with logistic time-varying delays Aziz Belmiloudi IRMAR-Université Rennes1, centre de maths-INSA de Rennes, 20 avenue des Buttes de Coësmes, CS 14315, 35043 Rennes Cédex, France

Optimal control problems of nonlinear degenerate parabolic ...

Optimal Control for Processes Governed by Mildly Nonlinear Differential Equations of Parabolic Type I Prof. Dr. L. V. Wolfersdorf Bergakademie Freiberg, Sektion Mathematik, DDR⎕92 Freiberg, Bernhard⎕von⎕Cotta⎕Str. 2

Optimal Control for Processes Governed by Mildly Nonlinear ...

The optimal control problem then is to minimize the functional J with respect to p subject to the problem i.e. to find p ⎕ B M such that (3.2) J (p) = inf q ⎕ B M J (q). We first state and prove the existence theorem of optimal solution. Theorem 3.1. Let Assumptions (H1)⎕(H3) and (H5) hold. Then, problem admits at least one optimal control. Proof

Nonlinear optimal control problems of degenerate parabolic ...

Control of systems modelled by non-linear partial differential equations (PDE⎕s) has been studied for a number of applications, including wastewater treatment ... C. Li, E. Feng, J. Liu, Optimal control of systems of parabolic PDEs in exploitation of oil, Journal of Applied Mathematics and Computing 13 (1) (2003) 247.

Optimal Controller and Actuator Design for Nonlinear ...

parabolic. type. case, Papageorgiou ... We consider the problem of an optimal control of the wave equation with a localized nonlinear dissipation. An optimal control is used to bring the state ...

(PDF) OPTIMAL CONTROL PROBLEM FOR THE NONLINEAR HYPERBOLIC ...

Abstract: This paper addresses the approximate optimal control problem for a class of parabolic partial differential equation (PDE) systems with nonlinear spatial differential operators. An approximate optimal control design method is proposed on the basis of the empirical eigenfunctions (EEFs) and neural network (NN). First, based on the data collected from the PDE system, the Karhunen-Loève ...

Approximate Optimal Control Design for Nonlinear One ...
The controller is shown to be effective to deal with an optimal control problem defined for a nonlinear PDE system subject to many constraints in its actuators. Next, using the Proper Orthogonal Decomposition (POD) and Galerkin Projection techniques, we derive a finite dimensional ODE (Ordinary Differential Equation) dynamical system that preserves the dominant dynamics of the original infinite dimensional PDE system.

Optimal control of a class of nonlinear parabolic PDE ...
Chekroun, Mickaël D., and Honghu Liu. 2015. "Finite-Horizon Parameterizing Manifolds, and Applications to Suboptimal Control of Nonlinear Parabolic PDEs." Acta Applicandae Mathematicae 135 (1): 81–144.

Finite-Horizon Parameterizing Manifolds, and Applications ...
Abstract: Optimal control of the singular nonlinear parabolic PDE which is a distributional formulation of multidimensional and multiphase Stefan-type free boundary problem is analyzed. Approximating sequence of finite-dimensional optimal control problems is introduced via finite differences.

[2006.07426] Optimal Control of Singular Parabolic PDEs ...
Existence of the Optimal Control for Stochastic Boundary Control Problems Governed by Semilinear Parabolic Equations. Mathematical Problems in Engineering, Vol. 2014, Issue. , p. 1.

Optimal control of quasilinear parabolic equations ...
This article proposes a new approach for the design of low-dimensional suboptimal controllers to optimal control problems of nonlinear partial differential equations (PDEs) of parabolic type. The approach fits into the long tradition of seeking for slaving relationships between the small scales and the large ones (to be controlled) but differ by the introduction of a new type of manifolds to ...

Finite-Horizon Parameterizing Manifolds, and Applications ...
In this paper, variational discretization directed against the optimal control problem governed by nonlinear parabolic equations with control constraints is studied. It is known that the a priori error estimates is $|||u - u_h|||_{L^\infty(J; L^2(\Omega))} = O(h + k)$ using backward Euler method for standard finite element.

Open Access Journals
In this paper sufficient second-order optimality conditions are established for parabolic boundary control problems with nonlinear boundary condition and constraints on the control and the state. The main idea is to extend the known theory for systems governed by ordinary differential equations to the case of partial differential equations.

SIAM Journal on Control and Optimization
In this paper, the existence of the solution of the parabolic partial fractional differential equation

is studied and the solution bound estimate which are used to prove the existence of the solution of the optimal control problem in a Banach space is also studied, then apply the classical control theory to parabolic partial differential equation in a bounded domain with boundary problem.

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