Ira Neitzel

Academic career

2006 - 2011	Research Associate, Institute for Mathematics, TU Berlin
2011	Dr. rer. nat. (summa cum laude), TU Berlin
2011 - 2013	Research Associate, Chair of Mathematical Optimization, TU Munich
2013 - 2015	Research Associate, Chair of Optimal Control, TU Munich
Since 2015	Professor (W2), Institute for Numerical Simulation, University of Bonn

Honours

2013	Ernst Otto Fischer Teaching Award, TU Munich
2013	Walther von Dyck Award, TU Munich

Invited Lectures

2017	Invited plenary lecture “Numerical Analysis for PDE-constrained Optimal Control Problems with Inequality Constraints”, Workshop on Optimal Control and Inverse Problems, 06.04.2017, Garching
2017	“Optimal control of quasilinear parabolic equations”, IFIP TC 7 Workshop “Optimal Control of PDEs on the occasion of Eduardo Casas’ 60th Birthday”, 19.09.2017, Castro Urdiales, Spain
2017	“Towards an Adaptive POD-FEM Solution Method for Parabolic Optimal Control Problems”, Miniworkshop “Adaptive Methods for Control Problems Constrained by Time-Dependent PDEs”, January 8-14, 2017, Oberwolfach
2017	“Optimal control of a regularized phase field fracture propagation model”, Minisymposium “Optimization with PDEs: Theory and Numerics”, SIAM Conference on Optimization, 22.05.2017, Vancouver, BC, Canada
2016	“Optimal Control of a Fracture Propagation Problem”, Minisymposium “Analysis and Numerical Methods for the Optimal Control of PDEs”, 20.07.2016, ECM Berlin

Research Projects and Activities

Project “Optimization Fracture Propagation Using a Phase-Field Approach”,
within DFG Priority Program SPP 1962 “Nonsmooth and Complementarity-based Distributed Parameter Systems: Simulation and Hierarchical Optimization”
with Prof. W. Wollner, Darmstadt, since 2016
DFG Collaborative Research Center 1060 “The Mathematics of Emergent Effects”
Member
DFG Cluster of Excellence “Hausdorff Center for Mathematics”
Member

Research profile

My research is concerned with the analysis and numerical analysis of PDE-constrained optimal control problems, subject to additional constraints. Theoretical questions include the derivation of optimality conditions in function spaces, stability analysis, and regularization issues. Moreover, I am interested in error estimates for the finite element discretization, and convergence of solution algorithms. Past and present research includes the discussion of convex and nonconvex elliptic and parabolic control problems, and semi-infinite programming problems arising in PDE-constrained optimization.

Future work will focus in particular on open questions regarding the analysis and numerical analysis of nonconvex time-dependent problems regarding the development of optimality conditions and a priori as well as a posteriori discretization error estimates. A model problem to be considered is optimal control of fracture propagation.

Research Area B I focus on theoretical challenges of nonconvex optimization problems in function spaces as well as optimal control. Necessary and sufficient optimality conditions of such problems are of particular interest.

Research Area J I contribute my expertise on the numerical analysis and solution of optimal control problems, including a priori regularization or finite element discretization error estimates as well as convergence analysis of solution algorithms.

Supervised theses

Master theses: 2, currently 2

Selected publications

[1] I. Neitzel, T. Wick, and W. Wollner. An optimal control problem governed by a regularized phase-field fracture propagation model. *SIAM J. Control Optim.*, 55(4):2271–2288, 2017.

[2] Mariano Mateos and Ira Neitzel. Dirichlet control of elliptic state constrained problems. *Comput. Optim. Appl.*, 63(3):825–853, 2016.

[3] Pedro Merino, Ira Neitzel, and Fredi Tröltzsch. An adaptive numerical method for semi-infinite elliptic control problems based on error estimates. *Optim. Methods Softw.*, 30(3):492–515, 2015.

[4] Ira Neitzel, Johannes Pfefferer, and Arnd Rösch. Finite element discretization of state-constrained elliptic optimal control problems with semilinear state equation. *SIAM J. Control Optim.*, 53(2):874–904, 2015.

[5] Klaus Krumbiegel, Ira Neitzel, and Arnd Rösch. Regularization for semilinear elliptic optimal control problems with pointwise state and control constraints. *Comput. Optim. Appl.*, 52(1):181–207, 2012.

[6] Ira Neitzel and Boris Vexler. A priori error estimates for space-time finite element discretization of semilinear parabolic optimal control problems. *Numer. Math.*, 120(2):345–386, 2012.

[7] Pedro Merino, Ira Neitzel, and Fredi Tröltzsch. On linear-quadratic elliptic control problems of semi-infinite type. *Appl. Anal.*, 90(6):1047–1074, 2011.

[8] Klaus Krumbiegel, Ira Neitzel, and Arnd Rösch. Sufficient optimality conditions for the moreau-yosida-type regularization concept applied to semilinear elliptic optimal control problems with pointwise state constraints. *Ann. Acad. Rom. Sci. Ser. Math. Appl.*, 2(2):222–246, 2010.

[9] Ira Neitzel and Fredi Tröltzsch. On regularization methods for the numerical solution of parabolic control problems with pointwise state constraints. *ESAIM Control Optim. Calc. Var.*, 15(2):426–453, 2009.

[10] Ira Neitzel and Fredi Tröltzsch. On convergence of regularization methods for nonlinear parabolic optimal control problems with control and state constraints. *Control Cybernet.*, 37(4):1013–1043, 2008.