

Seminar of the Chair of Optimization and Control
under prof. Stanisław Migórski
winter semester 2021-2022, Thursday, 10:15-11:45

October 7, 14, 21, 2021

Anna Ochal, A fixed point approach of variational-hemivariational inequalities

ABSTRACT: We provide a new approach in the study of a variational-hemivariational inequality in a Hilbert space, based on the theory of maximal monotone operators and the Banach fixed point theorem.

The talk will be based on the paper by R. Hu, M. Sofonea and Y. Xiao.

October 28, November 4, 2021

Krzysztof Bartosz, Polynomial approximation in star-shaped domain with application to virtual element method.

The talk will be based on:

1. Chapter 4 of S. C. Brenner, L. R. Scott, The Mathematical Theory of Finite Element Methods, 2008, Springer Science+Business Media, LLC
2. L. Beirão Da Veiga, F. Brezzi, A. Cangiani, G. Manzini, et al.: Basic principles of virtual element methods. Math. Models Methods Appl. Sci. 23(1), 1–16 (2013)

November 18, 25, 2021

Anna Valette, Uniform Poincaré inequality in o-minimal structures

ABSTRACT: At the beginning, we will define the trace on a domain Ω which is definable in an o-minimal structure. Next, we will show that every function $u \in W^{1,p}(\Omega)$ vanishing on the boundary in the trace sense satisfies Poincaré inequality. Finally, we will show that for a given definable family of domains $(\Omega_t)_{t \in \mathbb{R}^k}$, the constant of this inequality remains bounded, if so does the volume of Ω_t . This is joint work with Guillaume Valette.

December 2, 9, 2021

Piotr Bartman, Numerical analysis of a piezoelectric contact problem

ABSTRACT: We consider the quasistatic frictionless contact problem between a viscoelastic piezoelectric body and a deformable obstacle. The linear electro-viscoelastic constitutive law is employed to model the piezoelectric material and the normal compliance condition is used to model the contact. The variational formulation is derived in a form of a coupled system for the displacement and electric potential fields. A fully discrete scheme is introduced based on the finite element method to approximate the spatial variable and an Euler scheme to discretize the time derivatives.

Error estimates are derived on the approximative solutions and, as a consequence, the linear convergence of the algorithm is deduced under suitable regularity conditions.

The talk will be based on: M. Barboteu, J. R. Fernandez and Y. Ouafik, Numerical analysis of a piezoelectric contact problem, 2008

December 16, 2021

Anna Ochal, On doubly-history dependent variational inequality

ABSTRACT: We provide an elementary proof of the existence and uniqueness result for a doubly-history dependent variational inequality.

The talk will be based on: Wei Xu, Cheng Wang Mingyan He, Wenbin Chen, Weimin Han and Ziping Huang, Numerical analysis of doubly-history dependent variational inequalities in contact mechanics, Xu et al. Fixed Point Theory Algorithms Sci Eng (2021) 2021:24 <https://doi.org/10.1186/s13663-021-00710-7>

January 13, 2022

Krzysztof Winowski, Morse theory and Hilbert's 19th problem.

ABSTRACT: I will tell about some result in regularity theory in the calculus of variations, which is obtained by new method using ideas from Morse theory. The problem has its origin in the 19th Hilbert problem and some historical context will be also presented.

January 20, 2022

Oleksii Bulenok, Dominika Wilczyńska, Minimization of Coercive Forms.

ABSTRACT: We will present the characterization of the Minimizing Element with the equivalent alternative formulations represented by Variational Inequalities.

January 27, 2022

Jakub Gadawski, Wiktor Prządka, Variational approach to impulsive differential equations

ABSTRACT: We consider a linear Dirichlet problem and the solutions are found as critical points of a functional. We also study the nonlinear Dirichlet impulsive problem.

The talk is based on the paper: Variational approach to impulsive differential equations, Juan J. Nieto, Donal O'Regan, 25 October 2007, Nonlinear Analysis: Real World Applications 10 (2009) 680–690