
Variational Problems: Trends and Applications
Problèmes variationnels : tendances et applications
(Org: **Xinyang Lu** (Lakehead University) and/et **Chong Wang** (Washington and Lee University))

MUSTAFA AVCI, Athabasca University

Existence of solutions for a singular double phase variable exponent problem with $(p(\cdot), q(\cdot))$ – Hardy-type potential

In this work, we study a singular double phase variable exponent problem with $(p(\cdot), q(\cdot))$ – Hardy-type potential. We establish existence results using variational methods and critical point theory adapted to the non-standard growth setting, addressing the technical difficulties arising from the lack of homogeneity, the singular nature of Hardy potentials, and the interplay between variable exponents and phase transitions.

Keywords. Singularity; variable exponent; variational approach; critical point theory; Hardy-type potential; double phase operator.

LI BO, University of California, San Diego

Variational Modeling and Analysis of Phase Separation with Elasticity

We construct phase-field and sharp-interface free-energy functionals for phase separation with elasticity and prove the consistency of these models. Motivated by our numerical simulations, we study the boundary force using a variational method and discuss the role of such force in the droplet morphology and the kinetics of phase boundary movement. This is joint work with Shibin Dai of University of Alabama.

XINYANG LU, Lakehead University

JACK TISDELL, McGill University

Minimizing asymptotic score in random bullseye darts

We explore the problem of minimizing the expected score in a certain game of random bullseye darts. Given the bullseye distribution, which among a specified class of joint distributions for the n throws yields the optimal expected score? The asymptotics for i.i.d. throws are well understood. We are interested in whether or not certain natural joint distributions strictly improve upon the i.i.d. case and in this talk we present new general methods for studying this question and related problems.

TONG ZHANG, Memorial University

Liouville-type theorem for the fractional p -Laplacian inequalities

This work addresses an open question posed in [Math. Ann. 2022, "Quasilinear Laplace equations and inequalities with fractional orders"]. In the process of resolving this problem, we uncovered a key structural insight. This discovery enables us to establish the existence of solutions for a broad class of fractional p -Laplacian inequalities, extending to cases with logarithmic, exponential, and power-law decay at infinity. (Joint work with Professor Jie Xiao.)