

# Generalized Functions Online Workshop

May 12<sup>th</sup>, 2021

## Book of Abstracts

**Serena Federico**, 10:15 - 10:40

### **Smoothing and Strichartz estimates for some time-degenerate Schrödinger operators**

In this talk we will analyze the validity of smoothing and Strichartz estimates for some time-degenerate Schrödinger operators in the Euclidean setting. As an application of the aforementioned estimates some local well-posedness results for some suitable nonlinear and semilinear initial value problems will be given.

**Lyudmila Alexeyeva**, 10:40 - 11:05

### **Fundamental and generalized solution of Biot's equations and their properties**

To simulate seismic processes in the earth's crust, a two-component Biot's medium is investigated, containing solid elastic and liquid components. The dynamics of the medium under the action of different sources of disturbances of various types is considered. Using the Fourier transform of generalized functions, the Green tensor of the equations of motion is constructed. On its basis, calculation formulas are given for determining the displacements of medium components under the action of periodic and aperiodic sources of perturbations of an arbitrary type. The results of numerical experiments illustrating motion of liquid and solid components of Biot's medium are presented.

**Jasmina Veta Buralieva, 11:05 - 11:30**

**Asymptotic results for some generalized integral transforms**

The extension of integral transforms to generalized function spaces and their asymptotic analysis is an important research subject, that took attention on different authors. So, first we give a brief summary about some generalized asymptotics and make a short review of known results for integral transforms which are already extended on distribution spaces and their asymptotics. Then on more detailed manner, we provide the results about the extension of the directional short-time Fourier transform and Stockwell transform on the space of distributions, and we give several Abelian and Tauberian type results for these transforms.

**Panel discussion (moderated by Claudia Garetto):  
How to be a good ally to women in mathematics**

11:45-12:45

**Anabela Silva, 14:00 - 14:25**

### **The half-Hartley transform and an associated convolution operator**

The main purpose of this talk is to present a new convolution operator related to the Hartley transform defined on the positive half-line and in the framework of  $L^1$  Lebesgue spaces. For that purpose, some operational properties of the mentioned integral operator are exhibited. One of the most important properties of a convolution is to satisfy a factorization property which is typically associated with one or more than one integral operators (Convolution Theorem). In most of the cases, such factorization property is fundamental to solve consequent integral equations which can be characterized by those convolutions. In this sense, we show that the convolutions introduced exhibit certain factorization identities when considering the integral operators under studied.

**Daulti Verma, 14:25 - 14:50**

### **Hardy Inequalities on Metric Measure Spaces**

We are interested in giving the several characterisations of weights for two-weight Hardy inequalities to hold on general metric measure spaces possessing polar decompositions. Also, we prove the equivalence of few new scales of conditions. We give examples obtaining new weighted Hardy inequalities on  $\mathbb{R}^n$ , on homogeneous groups, on hyperbolic spaces, and on Cartan-Hadamard manifolds.

**Anita Tomar, 14:50 - 15:15**

### **On Geometry of fixed Points**

Aim of this talk is to study the geometric properties of the set of non-unique fixed points of a discontinuous self-map and establish fixed ellipse theorems. We also discuss shapes of ellipses in different metric spaces for different lengths of semi major axes and different foci and familiarize a fixed ellipse in a metric space. Towards the end, we discuss some examples and a real life problem and give some remarks to exhibit the feasibility of results, thereby providing a better insight into the analogous explorations. Motivation behind the talk is the fact that existence of non-unique fixed point plays an important role in Biology, Neural Networks, Economics, Artificial Intelligence and so on.

**Federico Bastianoni, 16:00 - 16:25**

### **Characterization of smooth symbol classes by Gabor matrix decay** (joint work with Elena Cordero)

We introduce the symbol classes  $S^m$ ,  $m \in \mathbb{R}$ , consisting of smooth functions  $\sigma$  on  $\mathbb{R}^{2d}$  such that  $|\partial^\alpha \sigma(z)| \leq C_\alpha (1+|z|^2)^{m/2}$ ,  $z \in \mathbb{R}^{2d}$ ; the  $H^s$  remainder class  $S^0_{\{0,0\}}$  is recaptured for  $m=0$ . We show that they can be characterized by an intersection of different types of modulation spaces. We exhibit almost diagonalization properties for the Gabor matrix of  $\tau$ -pseudodifferential operators with symbols in such classes, extending the characterization proved by Gr"ochenig and Rzeszutnik. Finally, the Gabor matrix of a Born-Jordan operator is computed and new boundedness results for such operators are inferred.

**Marianna Chatzakou, 16:25 - 16:50**

**q-Poincare inequalities on graded Lie groups**

We will discuss our results on (global) q-Poincare inequalities for probability measures on graded Lie groups. The probability measures under consideration have a density with respect to the Haar measure given as a function of a suitable homogeneous quasinorm.

**Bakhyt Alipova, 16:50 - 17:15**

**Generalized functions by obtaining of Green's Tensor of coupled thermoelasticity in 2D and 3D cases**

The thermally stressed state of the medium in 2D and 3D cases under the action of nonstationary concentrated mass forces and thermal sources is investigated. Nonstationary Green's tensors of an unbounded thermoelastic medium are constructed, their asymptotic properties are investigated. For the output of tensors, the apparatus of generalized functions, the properties of differentiation of generalized functions and convolution are used.