

Il giorno **Venerdì 30 Ottobre 2026 alle ore 12:30**, presso l'**Aula A3** del Dipartimento di Matematica e Informatica, la **Prof.ssa Bianca Satco** della Stefan cel Mare University of Suceava (Romania) terrà un seminario dal titolo **Differential problems with Stieltjes derivative and general boundary condition**. Tutti gli interessati sono invitati a partecipare.

Abstract

Let $g : [0, T] \rightarrow \mathbb{R}$ be a left-continuous nondecreasing function and μ_g the Lebesgue-Stieltjes measure generated by g on $[0, T]$.

The aim of the talk is to present an existence result [3] for first order set-valued problems with a very general boundary condition

$$\begin{cases} u'_g(t) \in F(t, u(t)), & \mu_g\text{-a.e. } t \in [0, T], \\ L(u(0), u(T)) = 0, \end{cases}$$

involving the Stieltjes derivative with respect to g (see [1]). The multifunction $F : [0, T] \times \mathbb{R} \rightarrow \mathcal{P}(\mathbb{R})$ is of Carathéodory type with convex compact values and $L : \mathbb{R}^2 \rightarrow \mathbb{R}$ is continuous and nonincreasing with respect to its second argument.

The applied method is that of lower and upper solutions inspired from [2].

The announced result generalizes several already known outcomes since the theory of Stieltjes differential equations encompasses various classical problems: ordinary differential equations (when g is the identity map), impulsive differential problems (if g can be written as a sum of the identical function with a sum of Heaviside functions) and dynamic equations on time scales.

Moreover, for particular maps L some existence results for Stieltjes differential inclusions with initial value conditions ($L(x, y) = x - u_0$) or with periodic conditions ($L(x, y) = x - y$) are covered.

References

- [1] R. López Pouso, A. Rodriguez, *A new unification of continuous, discrete, and impulsive calculus through Stieltjes derivatives*. Real Analysis Exchange 40 (2015), 319–353.
- [2] L. Maia, N. El Khattabi, M. Frigon, *Existence and multiplicity results for first-order Stieltjes differential equations*. Adv. Nonlinear Anal. 22(1) (2022), 684–710.
- [3] V. Marraffa, B. Satco, *Stieltjes differential problems with general boundary value conditions. Existence and bounds of solutions*. Czech. Math. J. (2024).

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Prof. Anna Rita Sambucini

