

Controllability of Semilinear Second-Order Differential Equations in Abstract Spaces

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Abstract

This talk is based on joint work with Valentina Taddei (University of Modena and Reggio Emilia, Italy).

We study the controllability of semilinear second-order problems in abstract spaces in the case when the right-hand side depends on the first derivative. At first, the definition of controllability for second-order problems in Banach spaces that considers both the solution and its derivative at the final point using a unique control is introduced. Afterwards, sufficient conditions for such controllability are obtained. The results are achieved by combining the Schauder fixed point theorem with the approximation solvability method and weak topology. This combination enables getting the results under easily verifiable and non-restrictive conditions imposed on the cosine family generated by the linear operator and without any requirements for compactness of the right-hand side. The talk concludes by applying the obtained results to a system governed by the Klein-Gordon equation.

References

- [1] M. Pavlačková, V. Taddei, On a new concept of controllability of second-order semilinear differential equations in Banach spaces. *Mathematical Control and Related Fields* 15 (3) (2025), 1150-1173. <https://doi.org/10.3934/mcrf.2025002>