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# OPTIMAL CONTROL, WELL-POSEDNESS AND SENSITIVITY ANALYSIS FOR A CLASS OF GENERALIZED EVOLUTIONARY SYSTEMS

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Abstract. In this paper, we are concerned with a generalized evolution dynamical system, called fractional differential variational-hemivariational inequality (FDVHVI, for short), which is composed of a nonlinear fractional evolution inclusion and a time-dependent mixed variational-hemivariational inequality in the framework of Banach spaces. The objective of this paper is four fold. The first one is to investigate the nonemptiness as well as the compactness of the mild solutions set to the FDVHVI. The second aim is to study the optimal control problems described by the FDVHVI. The third goal is to establish the well-posedness results of the FDVHVI, including the existence, uniqueness, and stability. Furthermore, the sensitivity analysis of a perturbed problem associated to the FDVHVI with respect to the initial state and the two parameters is also obtained. Finally, a comprehensive fractional model is given to illustrate the validity of our main results.

## 1. Introduction and problem formulation

Differential variational inequalities (DVIs, for short) were initially introduced and systematically discussed by Pang–Stewart [25] in Euclidean spaces. After

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