

**APPROXIMATE CONTROLLABILITY
FOR ABSTRACT SEMILINEAR IMPULSIVE FUNCTIONAL
DIFFERENTIAL INCLUSIONS
BASED ON HAUSDORFF PRODUCT MEASURES**

JIAN-ZHONG XIAO — XING-HUA ZHU

ABSTRACT. A second order semilinear impulsive functional differential inclusion in a separable Hilbert space is considered. Without imposing hypotheses of the compactness on the cosine families of operators, some sufficient conditions of approximate controllability are formulated in the case where the multivalued nonlinearity of the inclusion is a completely continuous map dominated by a function. By the use of resolvents of controllability Gramian operators and developing appropriate computing techniques for the Hausdorff product measures of noncompactness, the results of approximate controllability for position and velocity are derived. An example is also given to illustrate the application of the obtained results.

2010 *Mathematics Subject Classification.* Primary: 34A60, 34A37; Secondary: 93B05, 47D09.

Key words and phrases. Approximate controllability; impulsive system; second order semilinear differential inclusion; Cosine family of operators; fixed point for multivalued mapping.

This work is supported by the Natural Science Foundation of China Grant 11571176, 11701289.