Topological Methods in Nonlinear Analysis Volume 58, No. 1, 2021, 1–17 DOI: 10.12775/TMNA.2021.001

O2021 Juliusz Schauder Centre for Nonlinear Studies Nicolaus Copernicus University in Toruń

TRANSVERSALITY CONDITIONS FOR THE EXISTENCE OF SOLUTIONS OF FIRST-ORDER DISCONTINUOUS FUNCTIONAL DIFFERENTIAL EQUATIONS

Rodrigo López Pouso — Ignacio Márquez Albés Jorge Rodríguez-López

ABSTRACT. We are concerned with the existence of extremal solutions to a large class of first-order functional differential problems under weak regularity assumptions. Our technique involves multivalued analysis and the method of lower and upper solutions in order to obtain a new existence result to a scalar Cauchy problem. As a consequence of this result and a monotone iterative method for discontinuous operators, we derive our main existence result which is illustrated by several examples concerning well-known models: a generalized logistic equation or second-order problems in the presence of dry friction.

²⁰²⁰ Mathematics Subject Classification. Primary: 34A12, 34A36; Secondary: 34B15. Key words and phrases. Discontinuous differential equation; functional differential equa-

tion; monotone iterative method.

Rodrigo López Pouso was partially supported by Ministerio de Economía y Competitividad, Spain, and FEDER, Project MTM2016-75140-P.

Ignacio Márquez Albés was financially supported by Xunta de Galicia under grant ED481A-2017/095.

Jorge Rodríguez–López was financially supported by Xunta de Galicia under grant ED481A-2017/178.