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Noncompact perturbation of nonconvex noncompact sweeping process with delay

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Abstract: We prove an existence theorem of solutions for a nonconvex sweeping process with nonconvex noncompact perturbation in Hilbert space. We do not assume that the values of the orient field are compact.

Keywords: nonconvex sweeping process; functional differential inclusion; uniformly ρ -prox-regular set

AMS Subject Classification: 34A60, 34B15, 47H10

References

- Abdo M.S., Ibrahim A.G., Panchal S.K., State-dependent delayed sweeping process with a noncompact perturbation in Banach spaces, Acta Univ. Apulensis Math. Inform. 54 (2018), 139–159.
- [2] Aitalioubrahim M., On noncompact perturbation of nonconvex sweeping process, Comment. Math. Univ. Carolin. 53 (2012) no. 1, 65–77.
- [3] Aubin J.-P., Cellina A., Differential Inclusions: Set-Valued Maps and Viability Theory, Grundlehren der Mathematischen Wissenschaften, 264, Springer, Berlin, 1984.
- [4] Bounkhel M., Castaing C., State dependent sweeping process in p-uniformly smooth and q-niformly convex Banach spaces, Set-Valued Var. Anal. 20 (2012), no. 2, 187–201.
- [5] Bounkhel M., Thibault L., Nonconvex sweeping process and prox-regularity in Hilbert space, J. Nonlinear Convex Anal. 6 (2005), no. 2, 359–374.
- [6] Castaing C., Monteiro Marques M. D. P., Topological properties of solution sets for sweeping processes with delay, Portugal. Math. 54 (1997), no. 4, 485–507.
- [7] Castaing C., Valadier M., Convex Analysis and Measurable Multifunctions, Lectures Notes in Mathematics, 580, Springer, Berlin, 1977.
- [8] Clarke F. H., Stern R. J., Wolenski P. R., Proximal smoothness and the lower-C² property, J. Convex Anal. 2 (1995), no. 1–2, 117–144.
- [9] Edmond J.F., Delay perturbed sweeping process, Set-Valued Anal. 14 (2006), no. 3, 295–317.
- [10] Edmond J. F., Thibault L., Relaxation of an optimal control problem involving a perturbed sweeping process, Math. Program. 104 (2005), no. 2–3, Ser. B, 347–373.
- [11] Edmond J. F., Thibault L., BV solutions of nonconvex sweeping process differential inclusion with perturbation, J. Differential Equations 226 (2006), no. 1, 135–179.
- [12] Haddad T., Thibault L., Mixed semicontinuous perturbations of nonconvex sweeping processes, Math. Program. 123 (2010), no. 1, Ser. B, 225–240.
- [13] Moreau J. J., Application of convex analysis to the treatment of elastoplastic systems, Applications of Methods of Functional Analysis to Problems in Mechanics, Lecture Notes in Mathematics, 503, Springer, Berlin, 1976, 56–89.
- [14] Moreau J.-J., Evolution problem associated with a moving convex set in Hilbert space, J. Differential Equations 26 (1977), no. 3, 347–374.
- [15] Moreau J. J., Unilateral contact and dry friction in finite freedom dynamics, Nonsmooth Mechanics and Applications, International Centre for Mechanical Sciences (CISM), 302, Springer, Vienna, 1988, 1–82.
- [16] Sene M., Thibault L., Regularization of dynamical systems associated with prox-regular moving sets, J. Nonlinear Convex Anal. 15 (2014), no. 4, 647–663.
- [17] Poliquin R. A., Rockafellar R. T., Thibault L., Local differentiability of distance functions, Trans. Amer. Math. Soc. 352 (2000), no. 11, 5231–5249.
- [18] Thibault L., Sweeping process with regular and nonregular sets, J. Differential Equations 193 (2003), no. 1, 1–26.
- [19] Zhu Q. J., On the solution set of differential inclusions in Banach space, J. Differential Equations 93 (1991), no. 2, 213–237.