Periodic solutions for impulsive differential inclusions with state dependent impulses

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In the talk the guiding function method (see, e.g.,[1]) is used to find sufficient conditions for the existence of solutions to the following periodic multivalued impulsive differential problem in $\mathbb{R}^n$ with state dependent impulses

$$\begin{cases} \dot{y}(t) \in F(t, y(t)), & \text{dla p.w. } t \in [0, T],\ t \neq \tau_j(y(t)),\ j = 1, \ldots, m, \\ y(t^+) = y(t) + I_j(y(t)), & \text{dla } t = \tau_j(y(t)),\ j = 1, \ldots, m, \\ y(0) = y(T). \end{cases} \tag{1}$$

State dependence of barriers $\Gamma_j = \{(t, x) \in [0, T] \times \mathbb{R}^n; t = \tau_j(x)\}$ is one of the main obstacles in considerations. An appropriate function space for solutions to (1) with a suitable norm, proposed by Grudzka and Ruszkowski in [2], is a fruitful tool. With this tool, as one could see during the talk, we show that the multivalued solution operator for the initial problem associated with (1) is usc with compact R_δ-values, and the Poincaré translation operator along trajectories is admissible in the sense of the fixed point theory. Under suitable assumptions the composition of this operator with the evaluation $e_T(x) := x(T)$ has fixed points that correspond to periodic solutions of (1).

References

[1] L. Górniewicz, S. Plaskacz, *Periodic solutions of differential inclusions in R^n*, Boll. Unione Mat. Ital. A, 1993, Vol. 7(3), p. 409-420.

[2] A. Grudzka, S. Ruszkowski, *Structure of the solution set to differential inclusions with impulses at variable times*, Electron. J. Differ. Equ., 2015, No. 114, p. 1-16.

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