Title

DISCRETE APPROXIMATIONS AND OPTIMALITY CONDITIONS FOR CONTROLLED FREE-TIME SWEEPING PROCESSES

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The talk presents new results for the class of optimal control problems governed by discontinuous constrained differential inclusions of the sweeping type involving the duration of the dynamic process into optimization. We develop a novel version of the method of discrete approximations of its own qualitative and numerical values with establishing its well-posedness and strong convergence to optimal solutions of the controlled sweeping process. Using advanced tools of first-order and second-order variational analysis and generalized differentiation allows us to derive new necessary conditions for optimal solutions of the discrete-time problems and then, by passing to the limit in the discretization procedure, for designated local minimizers in the original problem of sweeping optimal control. The obtained results are applied to practical models of robotics, traffic equilibria, unmanned surface vehicle, and nanoparticle modeling.

[1] G. Colombo, B. S. Mordukhovich, D. Nguyen and T. Nguyen, Discrete approximations and optimality conditions for controlled free-time sweeping processes, Appl. Math. Optim. 89 (2024), DOI: 10.1007/s00245-024-10108-740.