

Relationship between the maximum principle and dynamic programming for minimax problems

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This talk is concerned with the relationship between the maximum principle and dynamic programming for a large class of optimal control problems with maximum running cost. Inspired by a technique introduced by Vinter in the 1980s (see [2]), we are able to obtain jointly a global and a partial sensitivity relation that link the coextremal with the value function of the problem at hand. One of the main contributions of this work is that these relations are derived by using a single perturbed problem, and therefore, both sensitivity relations hold, at the same time, for the same coextremal.

As a by-product, and thanks to the level-set approach, we obtain a new set of sensitivity relations for Mayer problems with state constraints. One important feature of this last result is that it holds under mild assumptions, without the need of imposing strong compatibility assumptions between the dynamics and the state constraints set.

This is a joint work with Hasnaa Zidani from INSA Rouen Normandie, France; see [1].

- [1] Hermosilla, C., Zidani, H. Relationship between the maximum principle and dynamic programming for minimax problems. *Appl Math Optim* 87, 34 (2023). <https://doi.org/10.1007/s00245-022-09943-3>
- [2] Vinter, R.B. New results on the relationship between dynamic programming and the maximum principle. *Math. Control Signal Systems* 1, 97–105 (1988). <https://doi.org/10.1007/BF02551239>