OPTIMAL CONTROL OF PIECEWISE DETERMINISTIC PROCESSES WITH PARTIAL DIFFERENTIAL EQUATION CONSTRAINTS

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Piecewise deterministic processes (PDPs) are stochastic processes where a deterministic motion is affected by a discrete Markov process, at random time epochs [1, 2]. A new framework for the optimal control of this kind of stochastic process, based on the probability density functions (PDFs) as state variable, is presented [3]. The PDF is described by a Fokker-Planck like partial differential equation that is used as constraint for the optimal control problem. The corresponding optimality system is solved numerically by using a conservative and positive preserving discretization scheme. The effectiveness of this methodology is tested on application problems in the scenario of non linear model predictive control strategies formulated as a sequence of open-loop optimality systems. A review of the proposed framework for other models with Gaussian noise driven stochastic processes is also shown [4, 5].

References

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