Leaping Horizon Model Predictive Control for Periodic and Switched Processes

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Abstract: Real time optimal control of periodic and switched dynamical processes is a difficult task, because it is not clear how to efficiently handle state discontinuities and switching events moving through the timehorizon.
In this talk we present leaping horizon model predictive control, which is especially suited for processes with state discontinuities and switching events and aims to make them accessible to model predictive control.
By adaptively choosing the length of the prediction horizon, we are able to combine benefits of both the moving-horizon and shrinking-horizon scheme. First the ability of the moving horizon scheme to handle continuous processes, and second, the good initialization properties of the shrinking-horizon scheme, which helps us to keep the feedback delay of the controller sufficiently short.
By analysing two possible real-world applications, namely the control of a simulated moving bed process from chemical engineering and the control of a power producing kite, we want to show how leaping horizon model predictive control can be applied in practice.

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