Explicit stabilized integrators for stiff optimal control problems

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Abstract

Explicit stabilized methods are an efficient alternative to implicit schemes for the time integration of stiff systems of differential equations in large dimension. In this talk, we construct explicit stabilized integrators of order two for the optimal control of stiff systems. We analyze their favorable stability properties based on the continuous optimality conditions. Furthermore, we study their order of convergence taking advantage of the symplecticity of the corresponding partitioned Runge-Kutta method involved for the adjoint equations. Finally, numerical experiments including the optimal control of a nonlinear diffusion-advection PDE illustrate the efficiency of the new approach.