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Solving optimal control problems with Julia

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J.-B. Caillau, O. Cots, J. Gergaud, P. Martinon, S. Sed The numerical solution of optimal control of dynamical systems is a rich process that typically involves modelling, optimisation, differential equations (most notably Hamiltonian ones), nonlinear equations (e.g. for shooting), pathfollowing methods⋯and, at every step, automatic differentiation. While tremendous efforts are being made in every one of the above-mentioned fields by the Julia community, there are still some missing parts to bridge the gap between them and have a fully satisfactory solving process - meaning: an abstract description, as close as possible to the mathematical problem formulation, and an efficient & reliable numerical computation. The Julia language has a lot to offer in this respect, and there already are excellent codes available [1, 2, 3, 4], while mostly oriented towards « direct solving » (that is direct transcription of the original optimal control problem into a mathematical program). We report on recent experiments with the Julia package OptimalControl from [5] on a variety of applied or more theoretical problems. 1. ControlSystems 2. InfiniteOpt 3. TrajectoryOptimization 4. Enzyme 5. control-toolbox

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