Parameters can be identified under

non-ideal constraints

Parameter estimation of discrete mechanics in a regularized Lagrange multiplier method

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Introduction

- High sim-to-real transfer requires accurate 3D multibody simulation models.
- Calibration can be done by offline parameter estimation of time-discrete multibody systems.

Results

• Able to closely reproduce the recorded Furuta pendulum measurements after optimization over a 13-dimensional parameter space.

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Furuta Pendulum



- Optimizing over the simulation error can be problematic due to stochastic dynamics and strong non-linearities.
- We propose a parameter estimation method for maximal coordinate descriptions with compliant constraints (non-ideal joints).

Method

- Collect measurement data from the real system.
- Preprocess data and solve a non-linear least squares optimization problem.
- Derivatives from a custom differentiable physics simulator based on a regularized semi-implicit time-stepper.



Conclusion

- Efficient parameter estimation under compliant constraints.
- Few design parameters makes the method easy to use.
- Flexible foundation to test new ideas.





Convergence







Scan for further details

