

Benchmarking of contact algorithms used in open-source physics engines

bachelor/project/master thesis

In the last decade, many open-source physics engines have emerged that allow to simulate mechanical systems with frictional contact interactions. See for example



<https://www.mujoco.org>,



<https://www.simtk.org/projects/opensim>,



www.sofa-framework.org

While the treatment of the rigid body dynamics is very similar in most of these codes, the modelling and numerical treatment of the frictional contact varies substantially between different software. This has various reasons, which all stem from the fact that the impenetrability of matter and Coulomb's friction law together typically lead to discontinuities and strong nonlinearities in the models. Hence, the developers of physics engines often either simplify the frictional contact model or use numerical tricks to find approximate solutions in order to get faster codes.

It is the goal of this project to validate and compare the different physics engines with respect to the contact algorithms they implement. To do so, the details of the implemented contact algorithms have to be researched and numerical benchmark tests have to be devised and performed.

requirements

- “multibody dynamics” or “computational multibody dynamics”.
- basic programming skills in e.g. Python, Matlab or C++.

contact

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