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Literature Review #2

For the second literature review the two articles I were able to find that had a similar topic to discuss dealt with concept of simulating rigid bodies. These two papers were research articles that went over each of their experiments of using computer generated environments to manipulate a constructed rigid body controlled via user. The first article titled *"Adaptive Integration for Controlling Speed vs Accuracy in Multi-Rigid Body Simulation"* focuses on the concept of being able to control the amount of rigid bodies being produced and how they can manipulate it, while the second article titled "*Mass Splitting for Jitter-Free Parallel Rigid Body Simulation"* talked about describing a new iterative method that solves large rigid body systems so they could avoid low jitter iteration counts without having to tax to much stress onto the system.

The first article talked about how the researchers were able to identify kinetic energy errors to move robots and generate an algorithm to adaptively adjust the simulation. Throughout the entire article it discussed how the researchers had to come up with various approaches to developing an algorithm on helping 3D models of robots with rigid body dynamics perform better. Basically, to maximize computational efficiency on the standard robotics approach. To do this, various algorithms and equations were needed to be developed just so they could have a starting point to work off. This way they would be able to exam the kinetic energy being exhorted from the 3D robot and see where it went wrong, a trial and error sort of thing. Fortunately, they were able to corelate the amount of errors generated form the robot and use it to indicate simulating stability. The higher the robot moved the more likely it was to crash, while less movement had a lower chance of crashing. Overall this subject is very useful when it comes to simulating any other things that we currently use or things that we might use in the future.

The second article talked about how researchers had developed a new algorithm to solve large rigid body systems simulations with the Projected Gauss-Seidel (PGS for short). To put it short, its basically a divide and conquer of another algorithm they're basing theirs on which is known as the Jacobi-based method. And this is something that they covered in the article, the massive parallels between the two methods however the researchers were able to prove which one was the more successful one. What really got me interested into this article however is the relationship between the linear algebra and the reading, throughout a majority of the article dealt with vectors and matrices and how they manipulated the flow of data coming from the simulations. Also, to conduct these experiments the researchers had to make use of current generation GPU's and CPU's. This is relevant to how in todays society we need to make sure that to stay up to date with our current needs, which are constantly evolving each day, and each year.

Both papers were great resources for individuals looking to learn more about the development of algorithms made for rigid body systems. Basically, how fast they're able to adapt and how much stress it emits on the hardware its being tested on. Many students, teachers, and practically everyone who uses a computer could benefit from understanding how far we've gone to understand and generate algorithms to help solve simulations.

Mass splitting for jitter-free parallel rigid body simulation

BibTex:

```
@article{Tonge:2012:MSJ:2185520.2185601,
 author = {Tonge, Richard and Benevolenski, Feodor and Voroshilov, Andrey},
 title = {Mass Splitting for Jitter-free Parallel Rigid Body Simulation},
 journal = {ACM Trans. Graph.},
 issue_date = {July 2012},
 volume = {31},
 number = {4},
 month = jul,
 year = {2012},
 issn = {0730-0301},
 pages = {105:1--105:8},
 articleno = {105},
 numpages = {8},
 url = {http://doi.acm.org/10.1145/2185520.2185601},
 doi = {10.1145/2185520.2185601},
 acmid = {2185601},
 publisher = {ACM},
 address = {New York, NY, USA},
 keywords = {contact, friction, non-smooth dynamics, rigid bodies},
}
```

ACM Ref:

Richard Tonge, Feodor Benevolenski, and Andrey Voroshilov. 2012. Mass splitting for jitter-free parallel rigid body simulation. ACM Trans. Graph. 31, 4, Article 105 (July 2012), 8 pages. DOI: https://doi.org/10.1145/2185520.2185601

Adaptive integration for controlling speed vs. accuracy in multi-rigid body simulation

BibTex:

```
@INPROCEEDINGS{7354139,
author={S. Zapolsky and E. M. Drumwright},
booktitle={2015 IEEE/RSJ International Conference on Intelligent Robots and Systems
(IROS)},
title={Adaptive integration for controlling speed vs. accuracy in multi-rigid body simulation},
year={2015},
volume={},
number={},
pages={5388-5394},
keywords={manipulator dynamics;adaptive integration;computational efficiency;controlling
speed;dynamics models;first-order accuracy;integration step size;kinetic energy;locomotion
robotics applications;manipulator;multirigid body simulation;rigid body dynamics;robotics
manipulation;simulation stability;smooth convergence;stable dynamic simulations;true dynamics
solution;virtual robot models;Convergence;Engines;Friction;Heuristic algorithms;Manipulator
dynamics;Stability analysis},
doi={10.1109/IROS.2015.7354139},
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ISSN={},
month={Sept},}

Refworks:

S. Zapolsky and E. M. Drumwright, "Adaptive integration for controlling speed vs. accuracy in multi-rigid body simulation," 2015 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Hamburg, 2015, pp. 5388-5394.
doi: 10.1109/IROS.2015.7354139
keywords: {manipulator dynamics;adaptive integration;computational efficiency;controlling speed;dynamics models;first-order accuracy;integration step size;kinetic energy;locomotion robotics applications;manipulator;multirigid body simulation;rigid body dynamics;robotics manipulation;simulation stability;smooth convergence;stable dynamic simulations;true dynamics solution;virtual robot models;Convergence;Engines;Friction;Heuristic algorithms;Manipulator dynamics;Stability analysis},
URL: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7354139&isnumber=7353104