

## 15-869 References on Position Based Simulation Jan 16, 2014

My primary references for today were the following two papers. The first is an easy read. The second is more up to date and in depth, and I like the way it introduces the motivation, mathematics, and main algorithm for any position-based dynamics system. Following these two papers are a number of quick references for those of you who may be interested in following up on a particular area of focus in the development of position based dynamics research.

Jakobsen, Thomas. "Advanced character physics." In *Game Developers Conference*, pp. 383-401. 2001.

<http://www.creas.ca/wp-content/uploads/2012/04/Advanced-Character-Physics1.pdf>

Bender, Jan, Matthias Müller, Miguel A. Otaduy, and Matthias Teschner. "Position-based Methods for the Simulation of Solid Objects in Computer Graphics." In *Eurographics 2013-State of the Art Reports*, pp. 1-22. The Eurographics Association, 2012.

<http://diglib.eg.org/EG/DL/conf/EG2013/stars/001-022.pdf>

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### Fast Strain Limiting

Kim, Tae-Yong, Nuttapong Chentanez, and Matthias Müller-Fischer. "Long range attachments: a method to simulate inextensible clothing in computer games." In *Proceedings of the 11th ACM SIGGRAPH/Eurographics conference on Computer Animation*, pp. 305-310. Eurographics Association, 2012.

<http://www.matthiasmueller.info/publications/sca2012cloth.pdf>

<http://www.youtube.com/watch?v=eHHlqK1Cm2k>

Müller, Matthias, Tae-Yong Kim, and Nuttapong Chentanez. "Fast Simulation of Inextensible Hair and Fur." In *VRIPHYS*, pp. 39-44. 2012.

[http://www.researchgate.net/publication/235259170\\_Fast\\_Simulation\\_of\\_Inextensible\\_Hair\\_and\\_Fur/file/d912f510b7f15d96c2.pdf](http://www.researchgate.net/publication/235259170_Fast_Simulation_of_Inextensible_Hair_and_Fur/file/d912f510b7f15d96c2.pdf)

<http://www.youtube.com/watch?v=zB8Fqbfrppo>

## **Adding Detail to a Coarse Simulation**

Müller, Matthias, and Nuttapong Chentanez. "Wrinkle meshes." In *Proceedings of the 2010 ACM SIGGRAPH/Eurographics symposium on computer animation*, pp. 85-92. Eurographics Association, 2010.

[http://www.researchgate.net/publication/220789187\\_Wrinkle\\_Meshes/file/32bfe5141ecb67ca28.pdf](http://www.researchgate.net/publication/220789187_Wrinkle_Meshes/file/32bfe5141ecb67ca28.pdf)

<http://www.youtube.com/watch?v=jyFk18Kbkcs>

Kavan, Ladislav, Dan Gerszewski, Adam W. Bargteil, and Peter-Pike Sloan. "Physics-inspired upsampling for cloth simulation in games." In *ACM Transactions on Graphics (TOG)*, vol. 30, no. 4, p. 93. ACM, 2011.

<http://www.seas.upenn.edu/~ladislav/papers/cup-sig11/cup-sig11.pdf>

<http://www.youtube.com/watch?v=fkKr4q9W8oM>

Zurdo, Javier S., Juan P. Brito, and Miguel A. Otaduy. "Animating Wrinkles by Example on Non-Skinned Cloth." *IEEE Transactions on Visualization and Computer Graphics* 19, no. 1 (2013): 149-158.

<http://www.gmrv.es/Publications/2013/ZBO13/>

## **Adding Internal Damping to an Object**

Schmedding, Ruediger, Marc Gissler, and Matthias Teschner. "Optimized damping for dynamic simulations." In *Proceedings of the 25th Spring Conference on Computer Graphics*, pp. 189-196. ACM, 2009.

[http://cg.informatik.uni-freiburg.de/publications/2009\\_SCCG\\_damping.pdf](http://cg.informatik.uni-freiburg.de/publications/2009_SCCG_damping.pdf)

[http://cg.informatik.uni-freiburg.de/movies/2009\\_SCCG\\_damping.avi](http://cg.informatik.uni-freiburg.de/movies/2009_SCCG_damping.avi)

## Shape Matching

Müller, Matthias, Bruno Heidelberger, Matthias Teschner, and Markus Gross. "Meshless deformations based on shape matching." In *ACM Transactions on Graphics (TOG)*, vol. 24, no. 3, pp. 471-478. ACM, 2005.

<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.88.651&rep=rep1&type=pdf>  
<http://www.youtube.com/watch?v=CCIwiC37kks>

Rivers, Alec R., and Doug L. James. "FastLSM: fast lattice shape matching for robust real-time deformation." In *ACM Transactions on Graphics (TOG)*, vol. 26, no. 3, p. 82. ACM, 2007.

<http://www.alecrivers.com/fastlsm/>  
Source code for 2D demo is available

Steinemann, Denis, Miguel A. Otaduy, and Markus Gross. "Fast adaptive shape matching deformations." In *Proceedings of the 2008 ACM SIGGRAPH/Eurographics Symposium on Computer Animation*, pp. 87-94. Eurographics Association, 2008.

<http://cg.inf.ethz.ch/Downloads/Publications/Papers/2008/Ste08b/Ste08b.pdf>

<http://graphics.ethz.ch/Downloads/Publications/PaperVideos/2008/Mar08%20-%20SGP%202008.mov>

## Shape Matching with Volume Conservation

Diziol, Raphael, Jan Bender, and Daniel Bayer. "Robust real-time deformation of incompressible surface meshes." In *Proceedings of the 2011 ACM SIGGRAPH/Eurographics Symposium on Computer Animation*, pp. 237-246. ACM, 2011.

<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.210.6661&rep=rep1&type=pdf>  
<http://www.youtube.com/watch?v=OLdKoyne3M>

## Oriented Particles

Müller, Matthias, and Nuttapong Chentanez. "Solid simulation with oriented particles." In *ACM Transactions on Graphics (TOG)*, vol. 30, no. 4, p. 92. ACM, 2011.  
<http://matthiasmuller.info/publications/orientedParticles.pdf>

<http://www.youtube.com/watch?v=LRHqs4GJuCA>