Reference List for 15-464 / 15-664 March 10, 2021

We started by looking at the following paper. If you really want to get a spring mass cloth simulation right, my favorite reference is this one. Features to look into include (1) how collisions (including self collisions) are handled by applying impulses to the cloth particles so that these collisions are never allowed to happen and (2) how impulses are similarly applied for "strain limiting" so that the cloth never stretches beyond a desired amount, and (3) how friction is handled.

Bridson R, Fedkiw R, Anderson J. Robust treatment of collisions, contact and friction for cloth animation. ACM Transactions on Graphics (ToG). 2002 Jul 1;21(3):594-603. http://dl.acm.org/citation.cfm?id=566623

One persistent problem with spring mass systems is that it can be difficult to set parameters for realistic appearance and to illustrate the different properties of different types of cloth. These two papers attempt to set parameters by optimizing to fit measurements taken on actual cloth swatches.

Wang H, O'Brien JF, Ramamoorthi R. Data-driven elastic models for cloth: modeling and measurement. InACM Transactions on Graphics (TOG) 2011 Aug 7 (Vol. 30, No. 4, p. 71). ACM. http://graphics.berkeley.edu/papers/Wang-DDE-2011-08/

Bhat, Kiran S., Christopher D. Twigg, Jessica K. Hodgins, Pradeep K. Khosla, Zoran Popović, and Steven M. Seitz. "Estimating cloth simulation parameters from video." In Proceedings of the 2003 ACM SIGGRAPH/Eurographics symposium on Computer animation, pp. 37-51. Eurographics Association, 2003. http://graphics.cs.cmu.edu/projects/clothparameters/

This paper addresses perceptual issues, trying to understand how simulation parameters might map to perception of cloth properties.

Sigal, Leonid, Moshe Mahler, Spencer Diaz, Kyna McIntosh, Elizabeth Carter, Timothy Richards, and Jessica Hodgins. "A perceptual control space for garment simulation." ACM Transactions on Graphics (TOG) 34, no. 4 (2015): 117. https://dl.acm.org/citation.cfm?id=2766971 https://www.youtube.com/watch?v=LJ_zxvsdcrw

Getting a good looking simulation is difficult, yet there are quite a number of great systems out there. Here are two which have source code available. We took a look at the second of these.

Umetani, Nobuyuki, Danny M. Kaufman, Takeo Igarashi, and Eitan Grinspun. "Sensitive couture for interactive garment modeling and editing." ACM Trans. Graph. 30, no. 4 (2011): 90-1. http://www.cs.columbia.edu/cg/SC/

Narain, Rahul, Armin Samii, and James F. O'Brien. "Adaptive anisotropic remeshing for cloth simulation." ACM transactions on graphics (TOG) 31, no. 6 (2012): 152. http://graphics.berkeley.edu/resources/ARCSim/

This paper used the simulation system of Narain et al. in a data-driven technique which used precomputation to get realtime display of clothing simulation.

Kim, Doyub, Woojong Koh, Rahul Narain, Kayvon Fatahalian, Adrien Treuille, and James F. O'Brien. "Near-exhaustive precomputation of secondary cloth effects." ACM Transactions on Graphics (TOG) 32, no. 4 (2013): 87. http://graphics.cs.cmu.edu/projects/exhaustivecloth/

This paper pioneered simulating cloth at the yarn level.

Kaldor, Jonathan M., Doug L. James, and Steve Marschner. "Simulating knitted cloth at the yarn level." In ACM Transactions on Graphics (TOG), vol. 27, no. 3, p. 65. ACM, 2008. https://www.cs.cornell.edu/projects/YarnCloth/

We looked at two recent papers towards the end of class:

Hoffman, Jonathan, Matt Kuruc, Junyi Ling, Alex Marino, George Nguyen, and Sasha Ouellet. "Hypertextural Garments on Pixar's Soul." In *Special Interest Group on Computer Graphics and Interactive Techniques Conference Talks*, pp. 1-2. 2020. https://graphics.pixar.com/library/CurveCloth/paper.pdf

Jin, Ning, Yilin Zhu, Zhenglin Geng, and Ronald Fedkiw. "A Pixel-Based Framework for Data-Driven Clothing." In *Computer Graphics Forum*, vol. 39, no. 8, pp. 135-144. 2020. https://physbam.stanford.edu/~njin19/pixel_based_cloth/

On Monday, I mentioned that implicit solvers can be used for cloth.   Here is the canonical reference on this topic:

Baraff, David, and Andrew Witkin. "Large steps in cloth simulation." In Proceedings of the 25th annual conference on Computer graphics and interactive techniques, pp. 43-54. 1998. https://www.cs.cmu.edu/~baraff/papers/sig98.pdf

Baraff, David, Andrew Witkin, and Michael Kass. "Untangling cloth." ACM Transactions on Graphics (TOG) 22, no. 3 (2003): 862-870. https://graphics.pixar.com/library/UntanglingCloth/paper.pdf

Finally, you may find this article interesting: https://www.fxguide.com/fxfeatured/cloth-simulation-opening-the-kimono/