Reference List for 15-464 / 15-664 February 20, 2023

We started by looking at basic cloth simulation, following the equation in MiniProject2 and the references linked in that document. These two references contain practical mechanisms to handle the usual things that come up in a cloth simulation – stability, appearance, collision, and self-collision.
https://graphics.stanford.edu/~mdfisher/cloth.html
https://steven.codes/blog/cloth-simulation/

We then moved on to the following paper. If you really want to get a conventional 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 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/

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 very brief 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/

Although we did not cover it in class, this paper is interesting for using 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 this recent paper towards the end of class:

Li, Yifei, Tao Du, Kui Wu, Jie Xu, and Wojciech Matusik. "DiffCloth: Differentiable cloth simulation with dry frictional contact." *ACM Transactions on Graphics (TOG)* 42, no. 1 (2022): 1-20. https://people.csail.mit.edu/liyifei/publication/diffcloth/ https://www.youtube.com/watch?v=WWmWuhJcPYY