

15-464 / 15-664 Reference List for Fluids

Fluids

You have the choice of starting from scratch or from an existing simulator.

We will cover in class, two papers that made fluid simulation practical in computer graphics. Implementing either is a fine final project.

Foster, Nick, and Dimitri Metaxas. "Realistic animation of liquids." Graphical models and image processing 58, no. 5 (1996): 471-483.

<http://www.cbim.rutgers.edu/dmdocuments/gmip96%20Foster.pdf>

Stam, Jos. "Real-time fluid dynamics for games." In Proceedings of the game developer conference, vol. 18. 2003. <http://www.autodeskresearch.com/pdf/GDC03.pdf>

The classic fluid control paper is this one:

McNamara, Antoine, Adrien Treuille, Zoran Popović, and Jos Stam. "Fluid control using the adjoint method." In ACM Transactions On Graphics (TOG), vol. 23, no. 3, pp. 449-456. ACM, 2004. <http://grail.cs.washington.edu/projects/control/>

This paper started out as a final project in this course and adds the idea of motifs:

Alfred Barnat, Zeyang Li, James McCann, and Nancy S. Pollard, Mid-Level Smoke Control for 2D Animation, Proceedings of Graphics Interface 2011 <http://graphics.cs.cmu.edu/projects/mlsc/>

This paper looks interesting for stylizing fluid appearance:

Browning, Mark, Connelly Barnes, Samantha Ritter, and Adam Finkelstein. "Stylized keyframe animation of fluid simulations." In *Proceedings of the Workshop on Non-Photorealistic Animation and Rendering*, pp. 63-70. ACM, 2014.

http://gfx.cs.princeton.edu/gfx/pubs/Browning_2014_SKA/index.php

The classic SPH paper is here:

Müller, Matthias, David Charypar, and Markus Gross. "Particle-based fluid simulation for interactive applications." In *Proceedings of the 2003 ACM SIGGRAPH/Eurographics symposium on Computer animation*, pp. 154-159. Eurographics Association, 2003.

<http://www.matthiasmueller.info/publications/sca03.pdf>

You may want to check out Matthias Müller-Fischer's web page: <http://matthias-mueller-fischer.ch/>

.. his 2008 SIGGRAPH course on real-time physics: <http://matthias-mueller-fischer.ch/>

.. and this recent paper

Macklin, Miles, Matthias Müller, Nuttapong Chentanez, and Tae-Yong Kim. "Unified particle physics for real-time applications." *ACM Transactions on Graphics (TOG)* 33, no. 4 (2014): 153.

<http://blog.mmacklin.com/flex/>

Ron Fedkiw's group has produced some amazing research on highly realistic simulation:

<http://physbam.stanford.edu/~fedkiw/>

Many of these algorithms are challenging to implement within a class project. However, you may wish to experiment with the PhysBAM simulation code library:

<http://physbam.stanford.edu/>