Personal Inquiry

Fluid Simulation in Computer Graphics

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Books:

Bridson, R., Fluid Simulation for Computer Graphics. A K Peters, Ltd., 6

This book covers the main aspects of how fluid simulations are done in the Computer graphics .The two major methods in which fluids are simulated are using the Grid based or Eulerian method and the particle based or Lagrangian approach. The Particle based simulations have the advantage of restoring their own properties such as mass, velocity, heat, temperature etc., as they are simulated as blobs of fluid. Grid based or Eulerian based simulations stores the fluid's velocity and or density as fixed points inside the simulations and are calculated on a per frame basis. Thus giving more accurate results, as it's calculated on a grid basis as oppose to calculating a bunch of particles. Since their calculations are based on a fixed-point basis, they tend to lose out on their mass and are also time-consuming.

Web References:

Failes, I. (2012). The Science of Fluid Simulation Part1 Available:

http://www.fxguide.com/featured/the-science-of-fluid-sims/

Last accessed 10th May 2012.

Fluid Simulation has become one of the most significant and commonly requested areas of real world simulations. This article explains the origin and development of Fluid simulation in the Computer Graphics industry and also about the rapid development and its evolution as one of the most popular and widely used Visual Effect in the Industry. It also discusses the Basic concepts of fluid simulation with respect to using the famous Navier-Stoke's Equation for Simulation and brings into account the various types of fluid simulations available and its practical implementation. It also presents a case study focusing on Exotic Matters Naiad as a fluid simulating tool.

Failes, I. (2012). The Science of Fluid Simulation Part 2 Available:

http://www.fxguide.com/featured/science-of-fluid-sims-pt-2-realflow/

Last accessed 10th May 2012.

This article is an extension of the previous article and in this the main focus is on the Next Limits Fluid simulating package called the Real Flow. It discusses the basic working principle of real flow and also explores the SPH (Smoothed Particle Hydrodynamics), Polygonization and SmOrganic Mesh of the Real Flow. It also brings into account the inaccuracies in the basic fluid solvers based on particles in creating realistic simulations and discusses about the Fusion CIS plugin written for Real Flow by the Fin to overcome these inaccuracies an a case study of its implementation in a commercial for coca cola and in the movies "The girl with a Dragon tattoo" and the "The Three Musketeers" Da Vinci's vault flood scene.

Failes, I. (2012). The Tech Behind the Tools of Avatar Part 2:Naiad Available:

http://www.fxguide.com/featured/The_Tech_Behind_the_Tools_of_Avatar_Part_2_Naiad/

Last accessed 10th May 2012.

The Avatar movie included a number of shots, which required extensive use of fluid simulations. For example: The Neytiri "Leaf drinking shot " which won the won the Best single visual Effect of the year, was completely created using the Exotic Matter's Naiad. This article provides an insight into the Exotic Matter's Naiad and discusses it as a powerful tool for creating ultra realistic fluid Simulations and also briefs about its unique node based approach. It also outlines the Naiad's GUI and also explains the similarities between the Exotic matter's Naiads Interface (NI) and Pixar's Renderman Interface (RI).

An Introduction to The Houdini12 's all new Flip Fluids from Side FX:
http://www.sidefx.com/index.php?option=com_content&task=view&id=2124&Itemid=360

An article on different methods of fluid simulations available on Houdini and their features:
http://www.sidefx.com/docs/houdini12.0/dyno/liquids

http://www.fxguide.com/featured/gullivers-travelling-mattes-green-screen-fluid-sims/

Failes, I. (2010). Narnia: The Dawn Treader's VFX Crew. Available:
http://www.fxguide.com/featured/Narnia_The_Dawn_Treaders_VFX_Crew/
Last accessed 11th May 2011.

Gourlay, M., 2011. "Fluid Simulation for Video Games (part 1- part 9)".

Available from:

http://software.intel.com/en-us/articles/fluid-simulation-for-video-games-part-1/

http://software.intel.com/en-us/articles/fluid-simulation-for-video-games-part-2/

http://software.intel.com/en-us/articles/fluid-simulation-for-video-games-part-3/

http://software.intel.com/en-us/articles/fluid-simulation-for-video-games-part-4/

http://software.intel.com/en-us/articles/fluid-simulation-for-video-games-part-5/

http://software.intel.com/en-us/articles/fluid-simulation-for-video-games-part-6/

http://software.intel.com/en-us/articles/fluid-simulation-for-video-games-part-7/

http://software.intel.com/en-us/articles/fluid-simulation-for-video-games-part-8/

http://software.intel.com/en-us/articles/fluid-simulation-for-video-games-part-9/   [Accessed 11th May 2012]