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Computer Graphics

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Literature Survey #2

Primary Paper:

- A Layered Particle-Based Fluid Model for Real-Time Rendering of Water
- Florian Bagar, Daniel Scherzer, and Michael Wimmer
- Wiley Online Library / Computer Graphics Forum

Secondary Paper:

- Real-time Breaking Waves for Shallow Water Simulations
- Nils Thurey, Matthias Muller-Fischer, Simon Schirm, Markus Gross
- IEEE Explore

The primary paper is about using layered based a model for real-time rendering of water. In connection to real-time rendering is also talks about foam formation and layer creation. The authors talk about previous work and how far that has gone and their new addition to the algorithm by adding a curvature flow for better rendering. The secondary paper is similar to the primary paper but talks more about specifics and its experiments are also more specific as it will be explained later. The secondary paper is about better shallow water simulations such as waves and surf riding. It will also talk about rigid body objects in the water, something that the primary paper doesn't talk about. But both papers do talk about its experiments and their results.

Both of these papers are important in that they both want to make better water simulations. The primary paper is important because it adds onto previous work and successfully uses the curvature flow to make smoother simulations of water and more realistic allowed it to be used in animations and more. Similar to the primary paper, the secondary paper is important because of better simulations but especially in shallow water and by adding onto previous work. Both also bring up the performance of the computer and this is important because it lets them know if the simulations are slowing down the pc, good resolution, and more. In general, both of these papers are important because both add onto previous work, similar goals, and have similar future planned work.

The primary paper starts off with an introduction to the topics that are covered in the paper. Touches on dynamic fluids, previous approaches, and new tactic they will try to for better rendering of water. In the previous works section, authors talk about methods and people who tried different methods. They talk about offline methods, real-time, and an approach that uses splatting. Than authors give a quick overview of what their methods adds to the previous works done. The work they add is changing the curvature flow for viewer distance and a foam layer. The authors than go on to talk more in details of they added, an adaptive curvature flow. The surface along its normal vector depending on the mean curvature of the surface is shifted. The problem of distant water is over-smoothed and closer water is under-smoothed is fixed using the curvature flow. Next, the paper talks about foam and foam formation. The Weber number equation is talked about and how it impacts foam creation. In addition to foam creation, layer creation in the water is also talked about. They than go on to explain its results and computational cost from their experiments. The three tests scenes are corridor, waterfall, and bamboo. They show how different iterations can affect the visualization and its computational cost. In the conclusion section, the authors summarize what they achieved and also state that they provide more realistic fluid rendering at a lower cost and its simple to implement.

The secondary paper is similar to the primary paper as it also wants to create better water simulations but specifically in waves and shallow water. In the introduction section, the paper gives a quick run down on how they plan to approach better wave-breaking simulations and other simulations as well. In the related works section, the authors talk about how noise textures and adding particles for sprays and foam has helped with better detail. The shallow water simulations section talks about multiple equations such as the Navier-Stokes and SW equations. In general SW simulations can trace floating objects, catch effects, and more. The authors than talk about their goal of the algorithm. They want to create a line of points on the front of each wave that could turnover/crest. They also talk about other formulas and equations. Wave path generation is the fluid sheet of an overturning wave. This is built from connected particles at the wave line. The authors than talk about rendering waves. They go into detail about how to render the waves like how they break in the real life. In the rigid body coupling section, they talk about physical objects floating/in the water. They talk about the difficulties of simulating a body beneath the water, how to fix it, and equations. The authors than give their results to their experiments. They also gives figures of the results, box/floating object, proximity of the camera, and computer performance such as fps, number of grid points. Overall, the results show that they accomplished what that has planned to do with some limitations such as not being able to handle chaotic waves in shallow water. The authors than conclude the paper about wave breaking, body simulations, and future work. One future work they would like to work on is detecting collision between different wave patches.

Both of these papers are similar and different. As mentioned earlier in the paper, authors of both papers talk about improvements to previous work using their methods and their results/experiments. The primary paper talks about curvature flow, foam creation, and its results of experiments and computer performance. The secondary paper talks about wave simulation, rigid body coupling, and just like the primary paper, its results of experiments and computer performance. Both papers are important because in general they want to make better simulations/rendering that can be used in scenes.