

## Wave Particles

**CONTACT**

**Cem Yuksel**

Department of Computer Science  
Texas A&M University  
College Station, Texas 77840 USA  
cem@cemyuksel.com



This video demonstrates a real-time dynamic water-wave simulation method with floating-object interaction. All images are rendered in real time using OpenGL and custom GPU shading. Our wave-simulation technique is based on wave particles, a new concept for efficiently representing dynamic fluid-surface deformations. We achieve realistic animations of floating objects by computing the forces between water and interacting objects. Objects create wave particles based on their motion in water and interactions with existing water waves. The system can simulate boat motion in water without applying external artificial forces on the boat. When a propeller is rotating, our fluid-to-object coupling technique computes the net force acting on the propeller, which is transmitted to the boat body. Similarly, user-controlled rotation of the rudder can rotate the boat while it is moving due to the computed lift force on the hull and the rudder. Object interaction combined with our wave-generation technique allows us to achieve natural water simulations in real time on a standard PC.

More information: Yuksel C., House, D., & Keyser, J. 2007. Wave Particles. ACM Transactions on Graphics (SIGGRAPH 2007).

**HARDWARE & SOFTWARE**

Images were rendered in real time using OpenGL and our custom GPU shaders on a standard PC with a 2.13 GHz Core2Duo processor and GeForce 7900 graphics card.