# New simulation method produces realistic fluid movements

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What does a yoghurt look like over time? The food industry will soon be able to answer this question using a new fluid simulation tool developed by the Department of Computer Science (DIKU) at the University of Copenhagen as part of a broad partnership with other research institutions. An epoch-making shift in the way we simulate the physical world is now a reality.

A five-year collaboration between the University of Copenhagen, the Technical University of Denmark (DTU) and the Alexandra Institute on simulating fluids in movement is now bearing fruit, and has earned the group a 'best paper award' at the highly esteemed Symposium on Computer Animation (SCA).

"Our new method is a breakthrough which will radically change tomorrow's computer simulation. We have taken the first step towards producing a more precise simulation of fluid materials than anything seen so far. Now we are looking forward to testing the method on a number of other materials with soft structures," says Associate Professor Kenny Erleben from the University of Copenhagen.

## Goodbye to statistical methods

The new fluid simulation tool can boast of being very similar to physical reality.

The method distinguishes itself significantly from known simulation methods which use mesh structures where the vertices are locked in a fixed position. In the new method, the mesh structure is replaced by a dynamic structure where the vertices move one at a time.

This makes it possible to take account of the fluid's physical properties more precisely and to see how different types of fluids interact with one another.

The method also ensures such a high degree of detail that even very thin structures become visible. With previous statistical methods, it is often a problem that the simulated object's edges and structures become blurred, and that its precise physical properties are hard to recreate.

## Food risk assessments and shelf-life

The new dynamic simulation method paves the way for countless applications.

First, as the company backing the research, the food producer Danisco wants to use the method to simulate the shelf-life of foods, for example yoghurt.

However, the research can also be used to perform risk assessments of, for example, oil slips and within building design.

For Kenny Erleben, it will be interesting to use the method to simulate the human body, for example clothing, hair, skin and patterns of movement.

But for the time being, the method cannot be used by what has traditionally been simulation research's biggest customers: games developers. This is because the simulation is extremely time-consuming as the vertices are moved one at a time.

It often takes a couple of minutes per image just for the simulation – added to which is the time it takes to generate the detailed images. Optimising the calculation times will therefore be one of the main focus areas in the ongoing research.

**More information:** iphys.wordpress.com/2012/07/18 … tured-moving-meshes/

Provided by University of Copenhagen

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