

The project involves fluid simulation, initially based on the methods outlined in Robert Bridson and Matthias Muller-Fischer's 2007 Siggraph course. Liquid fluids, and to a lesser extent gases, can be considered incompressible in most simulations. The behaviour of incompressible fluids is given by the Navier-Stokes equation:

[Navier-Stokes equation]

This is simplified by breaking the equation down into three parts: the advection, body, and projection equations, and applying their respective processes `advect`, `body` and `project` in sequence for each time step

When applied to the entire fluid, the advection equation enforces the conservation of energy (the fluid mass undergoes no net acceleration without the application of a net force). The `advect()` process applies the velocity field to the quantity `q` for a time `dt`. This quantity may be velocity itself, pressure, or another quantity relevant to the particular fluid (such as temperature for smoke simulation). Since in truth the fluid is acted on by the net force of gravity, the `body` process simply adds `gdt` to the velocity field (all the members of the grid). The incompressibility of the fluid is enforced by the

Seven Point Lagrangian Matrix `MIC(0)` preconditioner