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As computers get faster and architectures evolve, simulation of the dynamics of natural phenomena is becoming an increasingly indispensable tool for creating virtual worlds in movie special effects and video games. For example, nearly all companies involved in effects have a team dedicated to simulation-based dynamics of water, fire, smoke, explosions, rigid body dynamics and deformable/elastic bodies etc. Whether it's an exploding fireball in Star Wars: Episode 3 or a swirling maelstrom in Pirates of the Caribbean: At World's End, special effects leveraging numerical simulations can be seen in a wide range of Hollywood blockbusters. Although previously considered too involved and prohibitively expensive for applications like movie special effects, simulation of such phenomena is now much more practical on moderately powerful PCs. I will talk about the scientific computing techniques including computational fluid dynamics, computational solid dynamics, rigid body simulation, collision detection/resolution etc. used to make the viewing experience more realistic and controllable for the movie maker.

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