# Fireballs in *Shrek 2*

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## 1. Abstract

Once again, we had the opportunity to launch fireballs in the CG animated feature film *Shrek 2*. After a day of nursing cloth simulations, there is nothing more gratifying than launching huge flames of fiery goo into the air. The art direction for these fireballs added to the enjoyment.

The goal was to develop a fireball effect that:

- Integrates into the Shrek world and color palette,
- Has a unique look, and
- Is big, loud, and fun to watch.

Working with these directives allowed us to create a fireball that was somewhat real without being bound by the limitations of physics. What we ended up with was a big flaming rock emitting an enormous thick black contrail.

**Fig 1:** *Fireball*

To achieve this effect we combined several tools that had been created or improved since the inital work done on the original movie *Shrek*.

## 2. Flame System

For the flames surrounding the rock, we used our proprietary flame system that was developed after *Shrek.* This system was used on *Shrek 4D* and is currently used for all of the fire in *Shrek 2*. In order to give these flames the appearance of being hurled through the air, we drove their dynamics with a Maya fluid simulation. This caused the flames to distort and wrap around the rock as it moved and rotated.

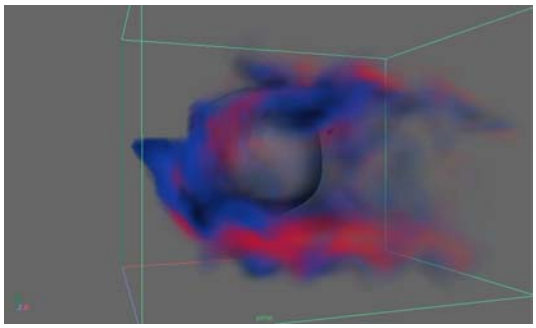

**Fig 2:** *Fluid Simulation*

## 3. Fireball

In addition, we used a new version of the dragon fireball from *Shrek*. One of the new features of this shader is the ability to add soot to the render treatment. This gives the fireballs a grittier/dirtier look and provides a great transition from the flames to the dark contrail.

## 4. Smoke

The contrail also used improved post-*Shrek* technology. The smoke used a volume render technique that was faster and provided greater control during the lighting process.

We used a volume shadowing method for the smoke – the same method we use to shadow hair in *Shrek 2*. Because of these improved rendering and shadowing techniques, we were able to iterate much faster and had far more control in terms of how the shadows interacted with the smoke.

This new method of volume shadowing computes a voxel grid with density and color before render time. The Lighting Artist has now gained the ability to interactively move, adjust, add, or delete lights without regenerating the shadow data. One of the great efficiencies here is the ability to share the data among multiple lights.

This is a much more efficient process than that used during the original movie, *Shrek*. We are now able to process a greater number of iterations and can allot more time upfront toward improving the quality of our volume rendering.

## 5. Additional Animation Credits

David Lipton