

Laurel Swift
MCEN 4228
11/10/04



Context

This image was created for group project 2. The intent of the image was to capture wispy stage fog flowing out of a box. The idea came from watching the stage fog flow out the box during our down time while trying to photograph vortex rings. Like the vortex rings, the fog coming from the box proved difficult to photograph.

Materials and Equipment

The equipment used to create the flow was a Rosco 1700 stage fog machine and a cardboard box with a 1.5" by 3" elliptical hole cut into the bottom. The fog machine heats a fluid of glycols and water [1] to vaporize it. The box was filled with fog through the hole in the bottom and placed on a table. The fog would flow out of the box. Vorticity was induced at the edges of the hole. The lid of the box could also be pushed on to create vortex rings. In this image, the lid of the box was slowly pushed inward and released to create a dense, slowly moving, irregularly shaped vortex ring.

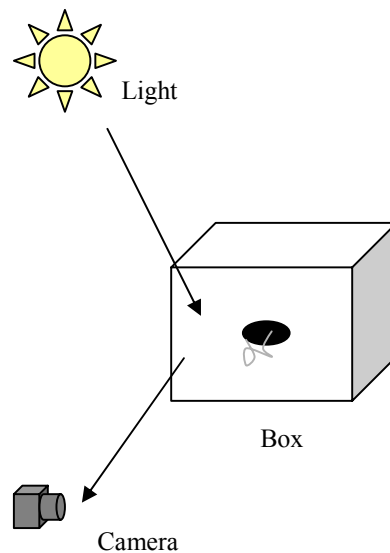


Figure 1. Vortex ring setup. Flow direction is out of the page.

Visualization Technique

The fog was visualized using two 500 watt incandescent lights. The camera flash was also utilized to produce more light because some images showed too little contrast between the smoke and the background. The lights were placed above the box and the camera was positioned on a tripod below the box to take advantage of mie regime light scattering by the fog particles. Mie scattering occurs with small (less than $20\ \mu\text{m}$) particles. All wavelengths of light are scattered so the particles appear white [2]. The most intense light scattering occurs at an angle of about 120° [class lecture], so we attempted to set up our flow so that the light scattered at this angle went toward the camera. A piece of black posterboard was used as a background for contrast.

Photographic Technique

The image was taken from about 24 inches below the mouth of the box. The field of view was approximately 4.5 by 6 inches. The camera used was a Canon A70 digital camera. The focal length used was 16.2mm, with a 3X optical zoom. The A70 also allows further digital zoom to 12X magnification. This image was taken with a 3.0X zoom. The aperture was set to F4.0 and auto focusing and shutter speed features were used. The equivalent ISO sensitivity was set to 400. The image was processed in Adobe Photoshop using the auto levels adjustment. The image was cropped from 1536 by 2048 pixels to 1278 by 1747 pixels.

Image Critique

The image shows some vorticity effects. The fog looks slightly blurred, while irregular coloring in the background is sharply focused. This could be improved by prefocusing on a ruler and ensuring that the depth of field is large enough to capture the entire flow since it is three dimensional. In addition, a strobe could help to increase the incoming light without creating motion blur, which was problematic in our vortex ring visualization. A background that appears more black instead of speckled and slightly reflective would also improve the quality of this image.



Figure 2. Unaltered image

1. http://www.rosco-ca.com/technotes/fog/fog_faq.html
2. [http://ww2010.atmos.uiuc.edu/\(Gh\)/guides/mtr/opt/mch/sct.rxml](http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/opt/mch/sct.rxml)

