Micoy vs. Standard Stereoscopic Projections

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Test Setup

In an attempt to quickly explain the differences between Micoy's proprietary stereoscopic projection techniques and those of standard industry practice, I've set up a simple demonstration scene (Fig 1). By viewing renderings of this scene using the various available techniques, we can see Micoy's advantages. Figure 2 shows a standard stereoscopic rendering of the scene as viewed by a basic rectilinear camera rig (no fancy lenses, just 2 cameras next to each other with a little separation between them). I've encoded the image using the age old anaglyph process (red-blue 3D glasses) because the resulting red and blue ghosting allows us to see where the stereo disparity, that provides the image's 3D effects, exists without needing all the fancy hardware. As figure 2 shows, red ghosting consistently appears on the right side of the columns. Since this stereo technique is universally accepted as a good way to film 3D for a flat screen, we'll use this ghosting pattern to judge the relative success of Micoy's stereo projection techniques when extrapolating to spherical and fisheye environments.

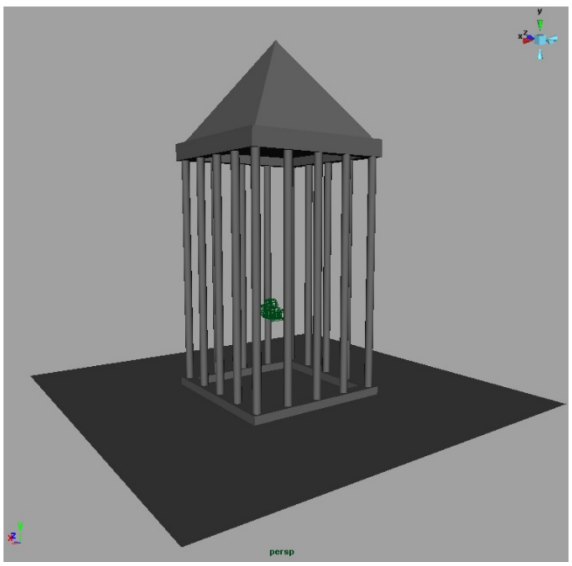

Figure 1: 3D Test Scene – Rectangular grid of columns with camera in center.

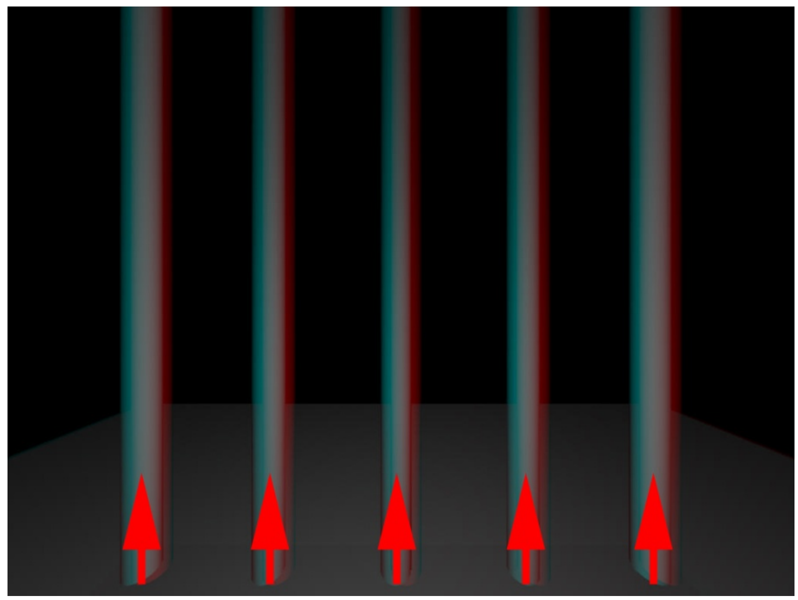

Figure 2: Stereo Image (Rectilinear Camera) – Red ghosting always on right side of columns.

Spherical Projections

We'll generate our spherical tests using an equirectangular projection (like a world map with latitude and longitude lines forming a regular grid) of the test environment. Figure 3 shows the result when using a standard stereo rig. Since the standard rig uses 2 cameras, each with a fixed viewpoint, the resulting imagery has irregular stereo disparity. As you can see, the red ghosting, and therefore the associated 3D effect, is only correct in the center of the image (red arrow). No disparity (and no 3D) exists at the black arrows, and the ghosting is completely reversed (left and right eyes are switched) at the blue arrows. Clearly this inconsistency of 3D effect causes significant problems when trying to navigate and view the environment.

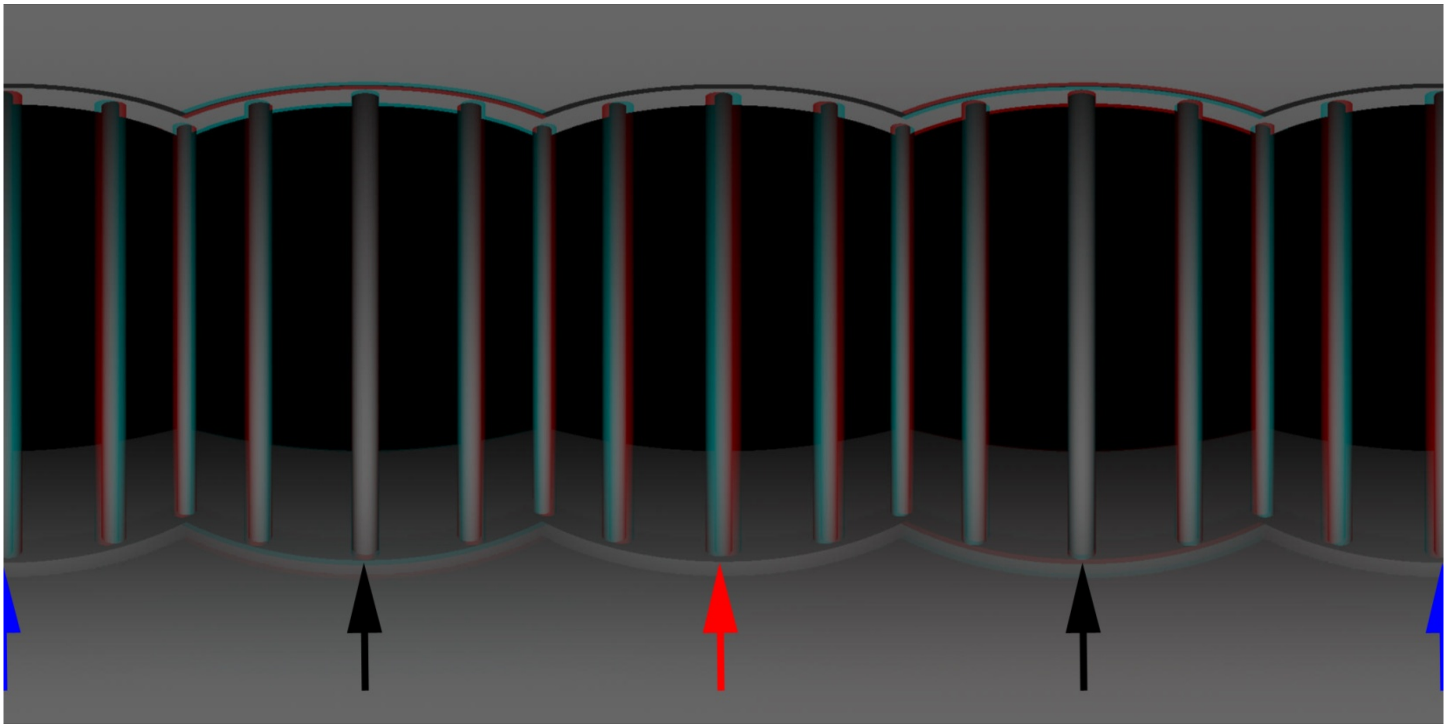

Figure 3: Stereo Image (Standard Equirectangular Projection) – Red ghosting is correct in the image center (red arrow), reversed at the edges (blue arrows), and nonexistent in between (black arrows).

In stark contrast, Micoy's equirectangular projection (Fig 4) displays proper stereo disparity throughout the entire spherical image. This property is of utmost importance for 3D viewing in a surround environment because it allows multiple viewers to simultaneously see proper 3D from different viewing positions and gaze directions without requiring any sort of additional tracking technology. As an added benefit, in single viewpoint or limited field of view applications (flat screen or hemisphere), these spherical images can be navigated (pan and scan) without re-rendering the scene.

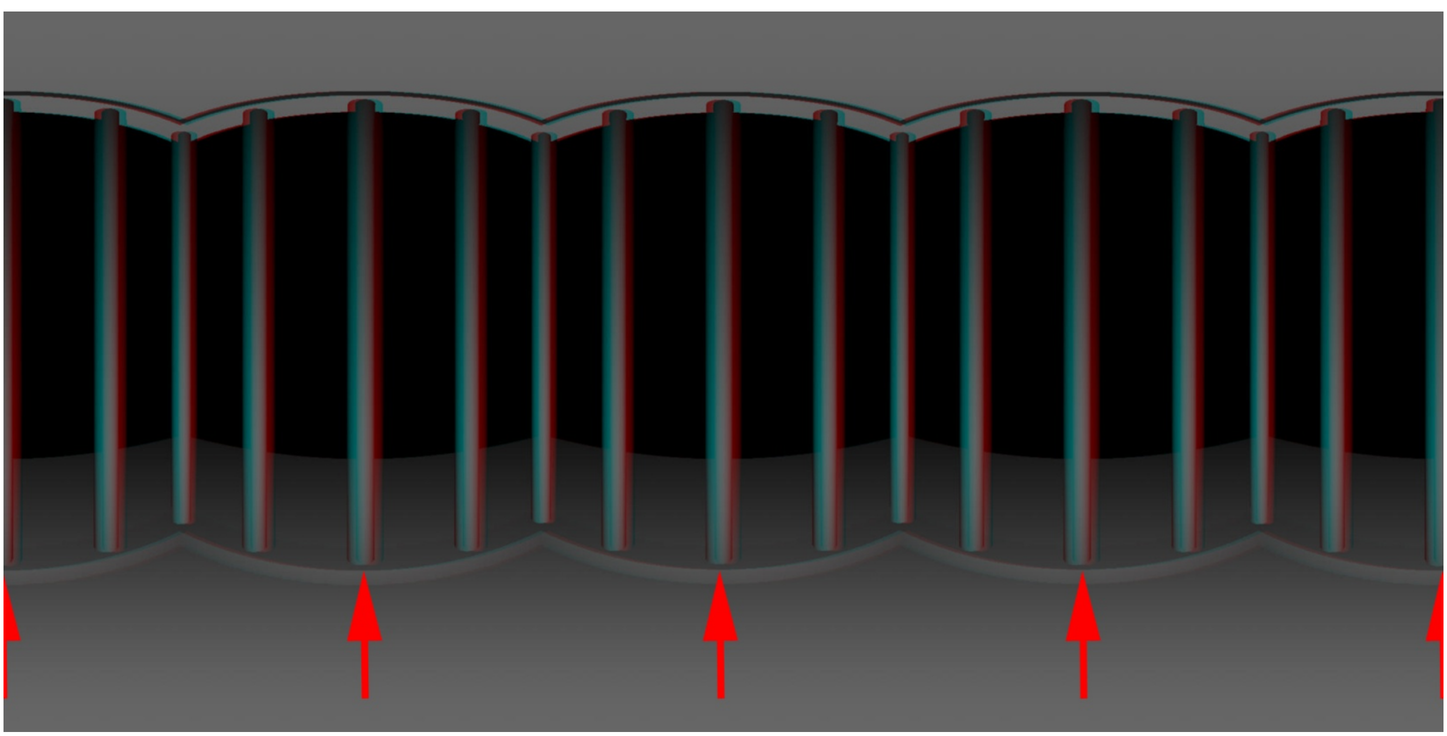

Figure 4: Stereo Image (Micoy Equirectangular Projection) – Stereo disparity is correct throughout the image.

Front Facing Fisheye Projections

When the same techniques are applied to front facing fisheye images, similar patterns emerge. Figure 5 shows the stereoscopic fisheye image that results from the standard camera rig. Again, the 3D effect is correct in the center of the image (red arrow), but degrades to nothing at the edges (black arrows). Again, Micoy's version of the fisheye image (Fig 6) displays proper 3D throughout the image.

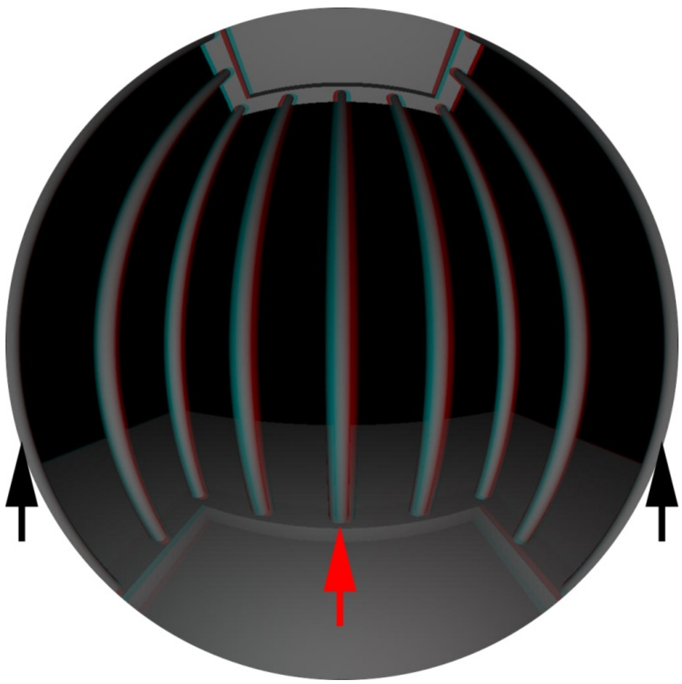

Figure 5: Stereo Image (Standard Front Facing Fisheye Projection) – Red ghosting is correct in the center of the image and nonexistent at the left and right edges.

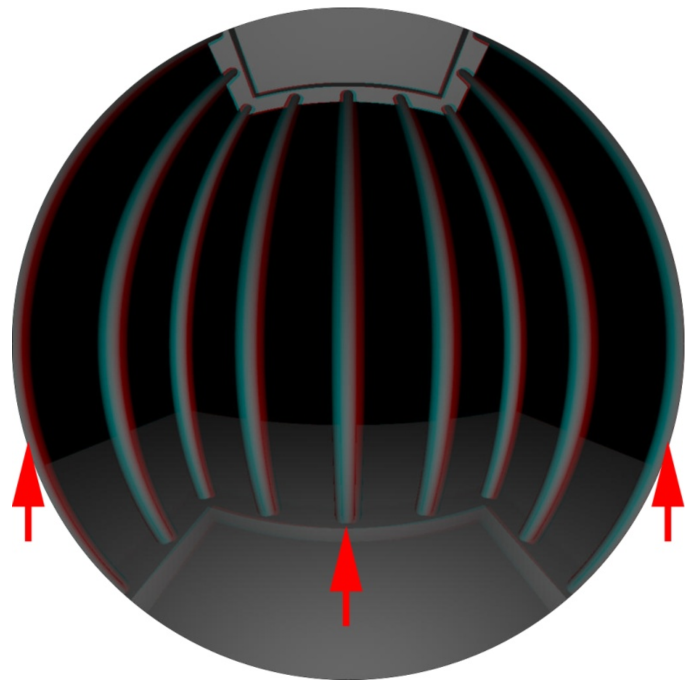

Figure 6: Stereo Image (Micoy Front Facing Fisheye Projection) – Red ghosting is correct throughout the image.

Above Facing Fisheye Projections

When applying these techniques to above facing fisheye images, slightly different judging criteria are necessary. In this situation, the viewer's gaze will typically fall close to the horizon line of the dome, which corresponds to the edges of the fisheye image (the center of the image falls on the apex of the dome). To maintain proper 3D effects, regardless of the viewer's gaze direction along the horizon, the image's stereo disparity should be radial. For the red ghosting to stay on the right side of the radiating columns during final projection, it must stay on the counter-clockwise side of the column in the fisheye image.

As was visible in the original spherical projections, the standard stereo rig produces irregular results (Fig 7). Proper 3D exists at the bottom of the image, no 3D exists at either side of the image, and the stereo disparity is reversed at the top of the image. Once again, Micoy's projection techniques results in proper 3D throughout the entire image.

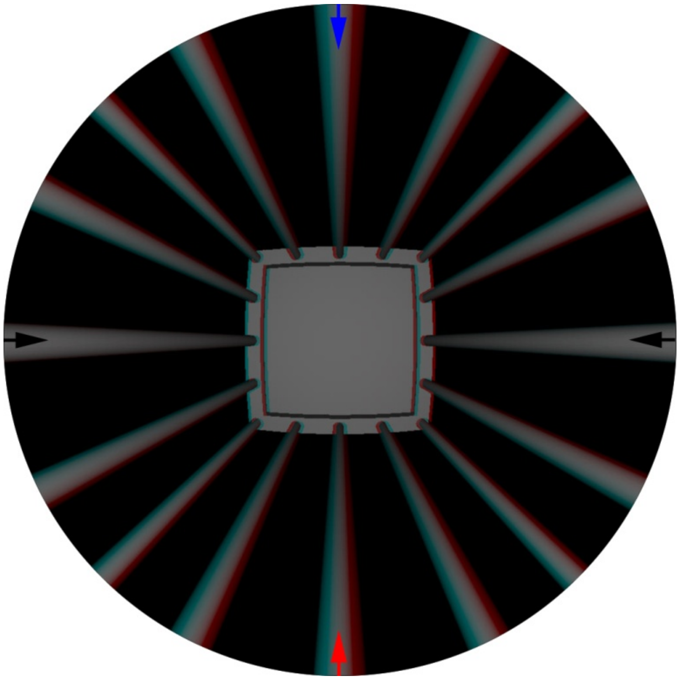

Figure 7: Stereo Image (Standard Above Facing Fisheye Projection) – Red ghosting is correct at the bottom of the image, nonexistent at the left and right edges, and reversed at the top.

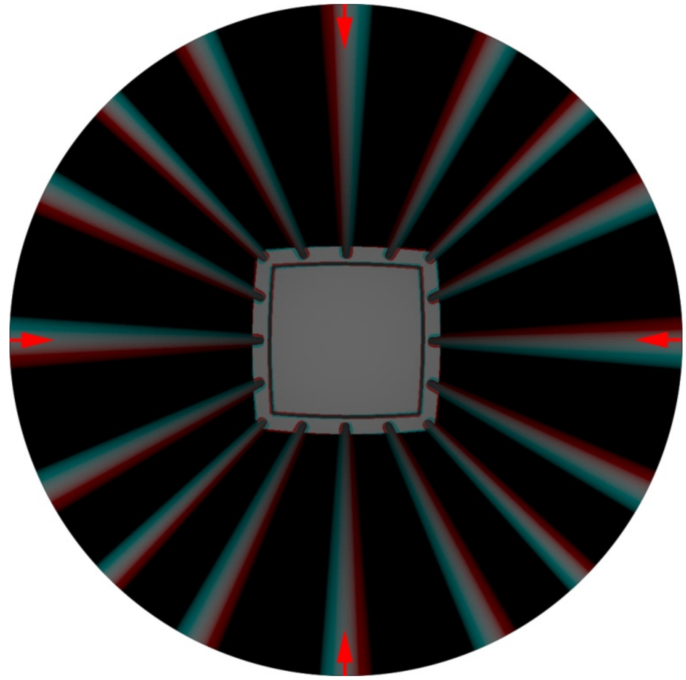

Figure 8: Stereo Image (Micoy Above Facing Fisheye Projection) – Red ghosting is correct throughout the image.

Conclusions

When comparing the stereoscopic disparity inherent in the spherical and fisheye images produced by standard 3D camera rigs to that of Micoy's proprietary rendering techniques, Micoy comes out as the clear superior. To date, Micoy's techniques provide the most accurate and engaging 3D effects for all multiuser and large field of view applications.