16.IndexOfRefraction2

Wednesday, April 21, 2010

8:50 AM

Still need help with setup and cleanup, at least two more people each. Thursday: Class discussion of art and science/engineering

2) cleaning

Discussion questions for Thursday

- 1. What is art? How do you know if an image is artistic?
- 2. What is science? How do you know if an image is scientific?
- 3. How are art and science similar?
- 4. How are they different?
- 5. What is engineering? How does it fit in (art vs science)?
- 6. What is filmmaking or photography? How does it fit in (art vs science)?
 - Discussion structure: In your groups, discuss.
 - Choose a scribe.

For each question, list answers (on paper, to hand in)

A) you agree on,

B) you disagree on

Then we will compare between groups.

Index of refraction techniques

Schlieren and shadowgraphy continued:

Minute paper: What would camera see looking at parallel light, camera lens

focused at infinity?

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Hint: what light sources do you know that emit parallel light? What do they look like?

1/2 got this right. Let's review lens laws:



Lens Laws

1) light through center of lens is undeflected

2) light parallel to axis goes through focal point

\$ focus point 3) all light entering lens at a given direction ends up at











http://www.mne.psu.edu/psgdl/Res-Optical.html

The thermal plume generated from a hot truck engine is visualized against a background of corn. The (a) original image is compared to one recorded 7 ms later to determine the (b) horizontal pixel shift. The contour plot of horizontal pixel shift in a BOS image is optically equivalent to a vertical knife-edge cutoff in traditional schlieren.

Pasted from <<u>http://www.mne.psu.edu/psgdl/Res-Optical.html</u>>



Hargather, Michael, and Gary S. Settles. "BACKGROUND-ORIENTED SCHLIEREN VISUALIZATI ON OF HEATING AND VENTILATION FLOWS: HVAC-BOS. Paper 266." In *ISFV14 - 14th International Symposium on Flow Visualization*, 1–8. EXCO Daegu, Korea, 2010.

Hargather, Michael John, and Gary S. Settles. "Natural-background-oriented Schlieren Imaging." *Experiments in Fluids* 48, no. 1 (January 1, 2010): 59–68. doi:10.1007/s00348-009-0709-3.

Focusing schlieren



Now, an even simpler method, using an encoded light field: Light Field Background Oriented Schlieren Photography (LFBOS) http://www.cs.ubc.ca/nest/imager/tr/2011/LFBOS/

Air-Water interface:
very large change in refractive index
Dip drip?

http://vimeo.com/28269726