19.DyeTech

Friday, October 30, 2020 2:55 PM

SPECIFIC FV techniques

Boundary techniques. Boundary between 'seeded' and unseeded fluid.
Choice depends on physics desired
I DYES **Today**. Mostly in water.
— Light/matter interactions in general
2 Index of refraction techniques
Monday 3 Light emitting fluids
4 Particles. In air (aerosols, fog, smoke)
5 Particles in water

Last time we ended with cloud tank technology. Would be great to try with our new city models from Mark Stock! See me for checkout.
Better clip: https://www.youtube.com/watch?v=pYVybOyMz-A Megan B

2)Want dye to show up - HIGH VISIBILITY

High Visibility: Want good contrast between dyed and ambient fluid.

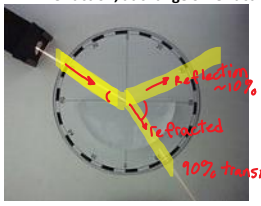
Ambient fluid = transparent = NO interaction with light refraction
Dyed fluid = want MAXIMUM interaction with light
Example: Alberto Seveso:
http://www.burdu976.com/phs/portfolio/2-colori-disatro-medicina/

In groups: talk about what you are doing for the next assignment, IV3 due Weds Nov11.
Then
Minute paper:
list the ways that dye (or any molecule) can interact with light (from external source, later will talk about emitted light)

- **Refraction**
- Absorption
- **Diffraction**
- **Reflection**
- Scattering/diffusion
- **Transmission**
- **Dispersion**

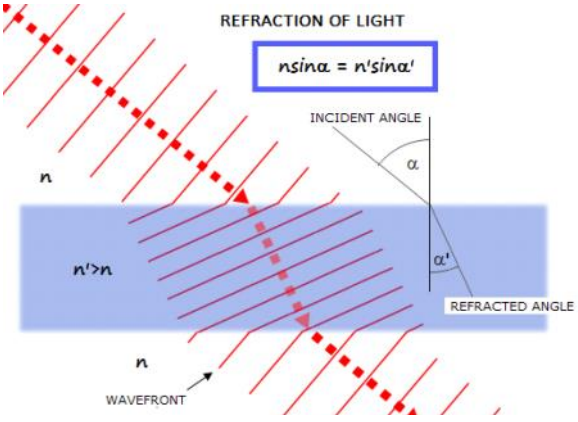
Emission
Fluorescence
Excitation
light emitting

1) **Transmission**
   - **Refraction, at change of refractive index**



Lecture 02 Overview2
Snell's law

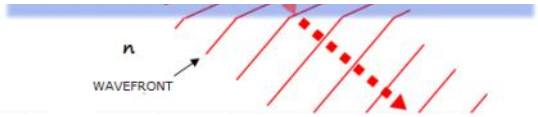
http://upload.wikimedia.org/wikipedia/commons/thumb/1/13/F%C3%A9nyt%C3%B6r%C3%A9s.jpg/220px-F%C3%A9nyt%C3%B6r%C3%A9s.jpg



There are many flow vis techniques based on refraction; will cover later.

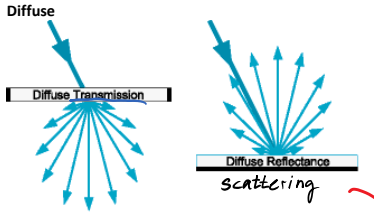
- **Diffuse**

There are many new vis techniques based on refraction; will cover later.



https://www.telescope-optics.net/reflection.htm

- **Diffuse**

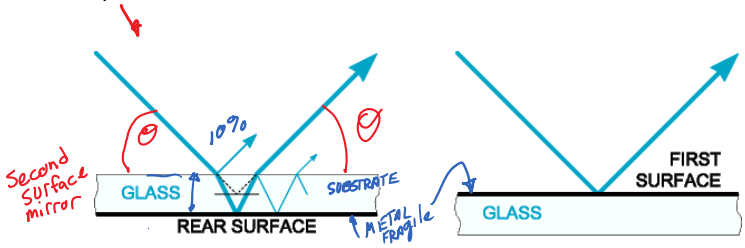


Diffuse transmission and reflectance.

http://library.thinkquest.org/26162/manili.htm

2) **Reflectance**
   - **Diffuse, scatter**
   - **Specular**

Edmund Scientific

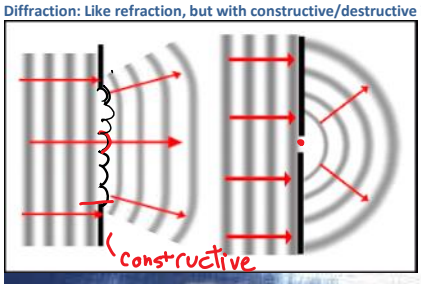


Reflection from a second surface and first surface mirror.

http://library.thinkquest.org/26162/manili.htm

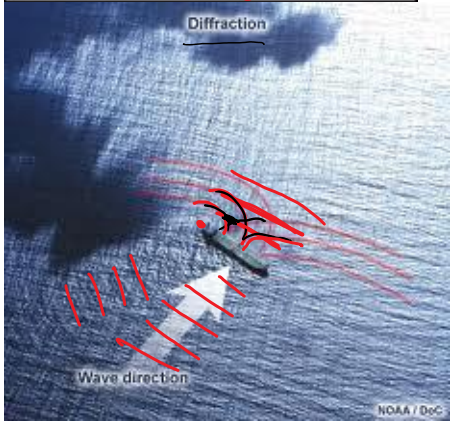
3) **Diffraction: Like refraction, but with constructive/destructive interference**

Fraunhofer diffraction, for incoming plane waves
Fresnel diffraction, for incoming spherical waves
(light source very close)



HUYGEN

http://www.meted.ucar.edu/marine/ripcurrents/NSF/media_gallery.php



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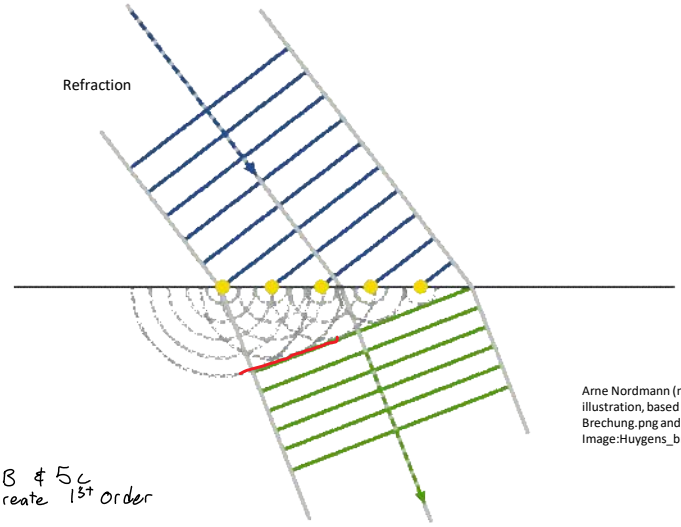
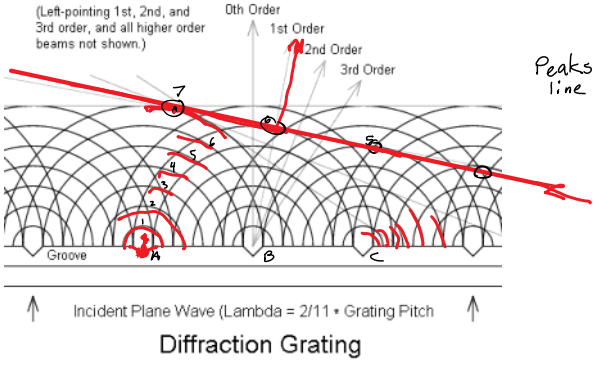


Arne Nordmann (norro) - Own illustration, based on Image:Wellen-Brechung.png and Image:Huygens_brechung.png

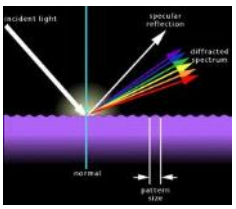


http://exoplanet.as.arizona.edu/~lclose/a302/lecture14/lecture_14.html

Peaks 7A, 6B & 5C line up to create 1st order

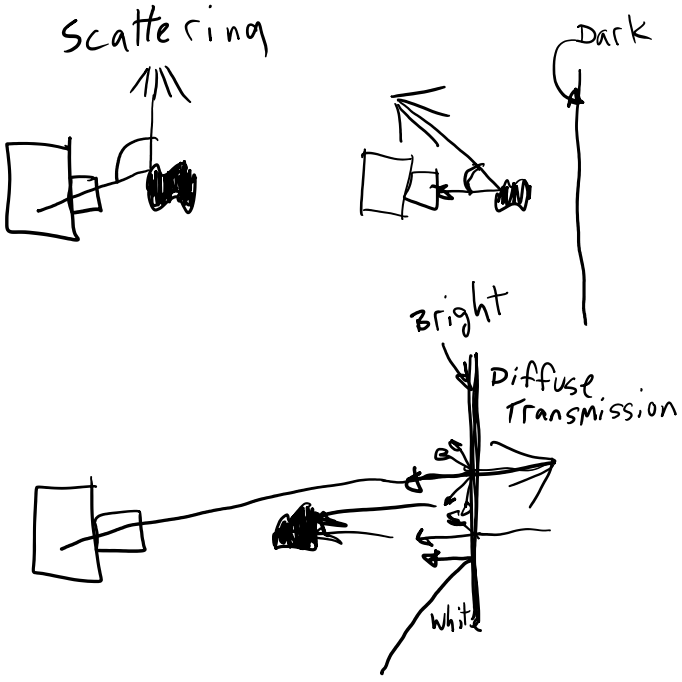
Dispersion → color aberrations

1ST orders



https://wiki.metropolia.fi/display/Physics/Diffraction

Minute Paper:
Sketch two setups showing how light interacts with dye: One a scattering setup (the dye scatters light), and one an absorbance setup. Show a typical light path from light source to dye to camera for each. In your breakout room, somebody share your screen; a whiteboard is one of the options. In View Options you can all select Annotate. Don't forget to save a jpg of your whiteboard; please post in Slack.



Dyes: water soluble
propylene glycol