

# Project Description

TDT4230 Graphics and Visualization

Sivert Utne

March 11, 2022

## Light Refraction, Dispersion and Reflection

For my project i want to explore realistic light behavior primarily through water and glass. Some things i hope to achieve is:

- Rainbow light by passing white light through a glass prism
- Visible bending of coloured laser through a glass lense
- Visible light refraction through water
- The cool light patterns below ocean waves
- Laser Dispersion patterns through different slits

Images of these effects are given at the end of the document.

From my research about how complicated these things are i found that making very basic refraction/reflection effect work isn't that difficult as long as it is only a single object (check if object is between fragment and camera and find refraction for that), however in order to achieve effects like the waves, or a laser passing through glass, i would have to find a way to perform this refraction for all light passing through all (transparent) objects/mediums. To have the light pass correctly through objects like this i will also have to account for coloured objects/filters that only allow certain colors to pass through.

The same is the case for dispersion, where getting it to work on a single object/surface shouldn't be too much of a hazzle (hopefully), even though you need to break the light down into its wavelengths and do some physics to get correct angles. But again, having this work accurately for scenes with several objects and light in different directions will be the main challenge, but hopefully something i will be able to achieve in the relatively short timeframe of the project. Depending on how difficult these effects are to implement i will prioritize them in the following order:

- Dispersion
- Refraction
- Reflection

Being able to create scenes where these effects work together should hopefully make me able to produce some visually stunning results.

In short, i want to be able to reproduce the following real life effects:

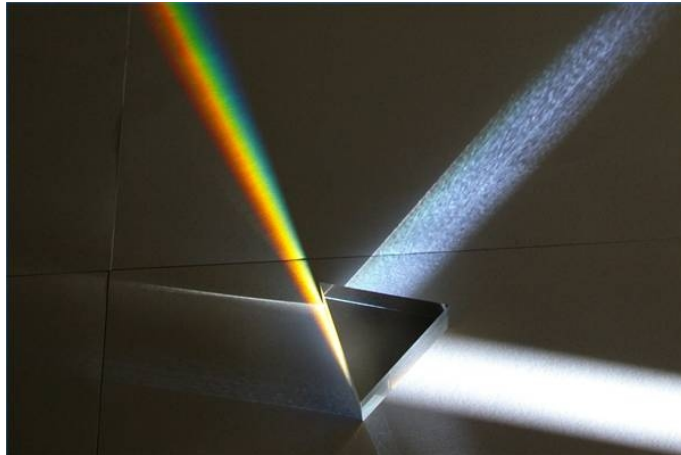


Figure 1: White light being dispersed into all visible colors due to their wavelengths.

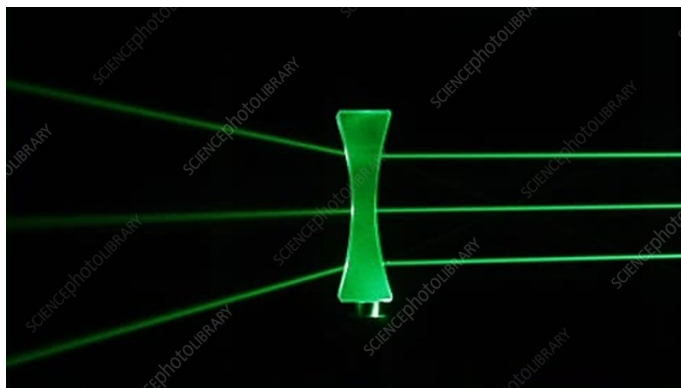


Figure 2: Laser passing through a glass lens



Figure 3: Water refraction causes it to appear like the arrow is pointing the other direction



Figure 4: Interesting refraction from water in a glass



Figure 5: Light refraction on sea floor based on waves above

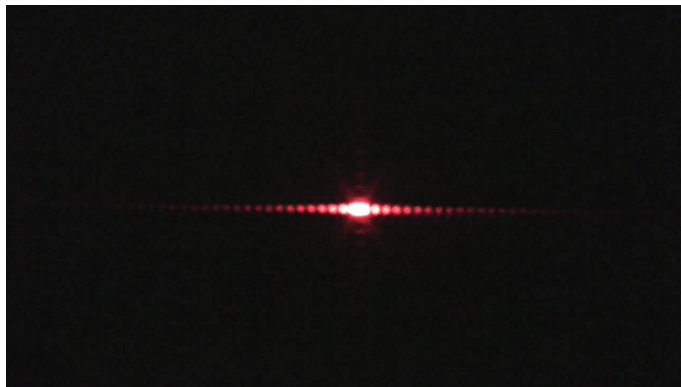


Figure 6: Laser Dispersion when passing through a single slit

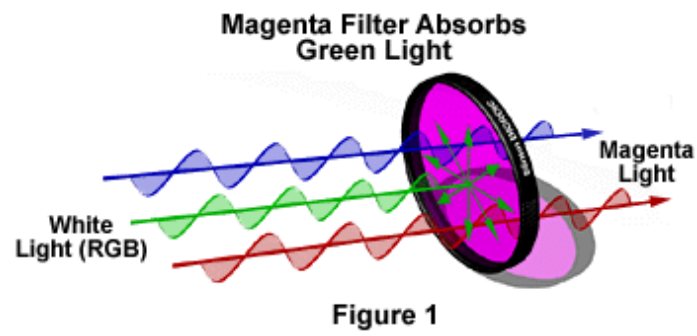


Figure 7: Light passing through a magenta filter will filter out the green light