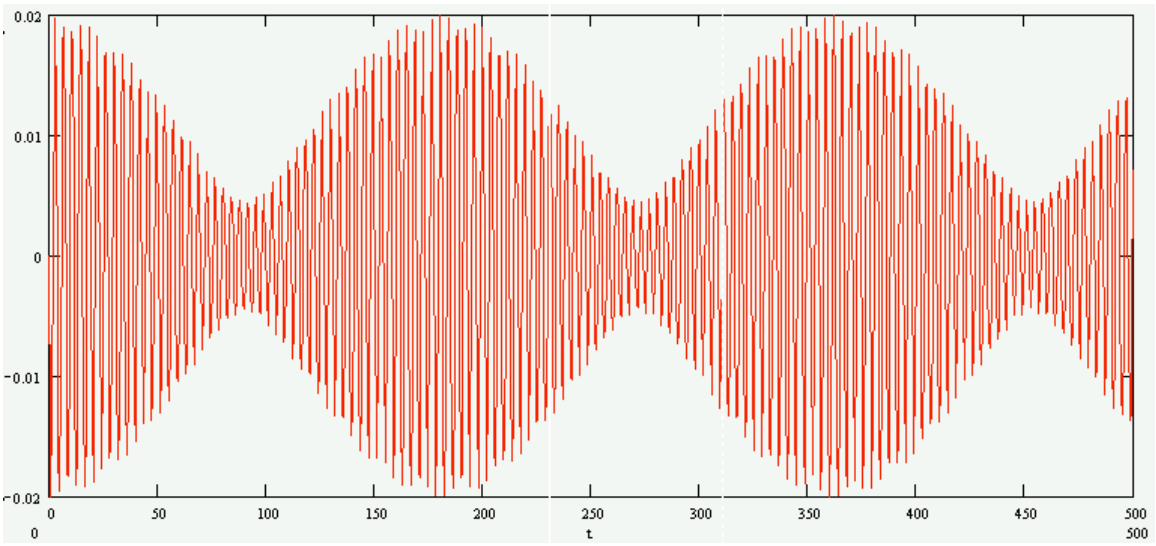
Phys 375 - Homework #5

1**)** *Simulated wavelength double data:*



a) The above figure shows simulated interferometer data from a light source that creates light at two closely spaced wavelengths. Like the interfereometer in our lab, the movable mirror is driven by a micrometer which is turned by a motor. For this data,

- The motor turns at 1 revolution per minute (this is different than the motor that we use in our lab, which turns at about 0.5 revolutions per minute),
- The micrometer advances by 0.5 millimeters in one complete revolution,
- The mirror moves one-fifth the distance that the micrometer moves (just like our interferometer).

Note that the x-axis in the figure is time. (Ignore the fact that the y-axis in the above figure shows negative values; our photodiodes always produce positive voltages).

For help with this problem you can refer to the notes for lecture 7 on the course website (hyperlink is here).

a) Count a reasonable number of fringes in the above figure to measure the average wavelength of the light source. (Note that the average wavelength will turn out to be in the infrared range.)

b) List approximate values of the time when the fringe visibility is high, and approximate values of the time when the fringe visibility is low. List all such values that you can identify.

c) What is the difference in the two wavelengths?