

OPTICAL CHOPPER PERFORMANCE WITH WAVELENGTH

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Figure 1 shows the predicted (Mathcad) waveform for an optical chopper that is operated at the wavelength it was designed for.

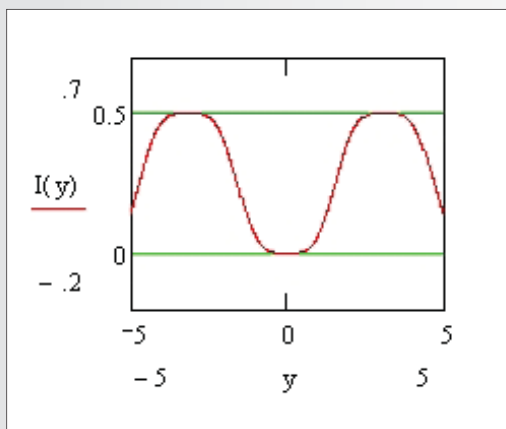


FIGURE 1. OPTICAL CHOPPER WAVEFORM AS PREDICTED BY MATHCAD

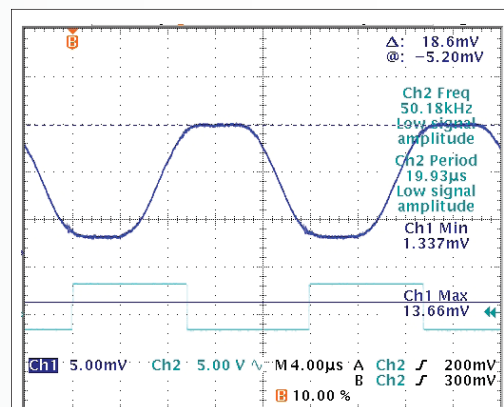


FIGURE 2. OPTICAL CHOPPER WAVEFORM SEEN IN THE LABORATORY

In the laboratory we observe a chopped waveform that is almost identical to the predicted one, as shown figure 2.

The next six diagrams show the waveforms predicted by Mathcad for optical choppers that are operated at wavelengths other than those for which they were designed.

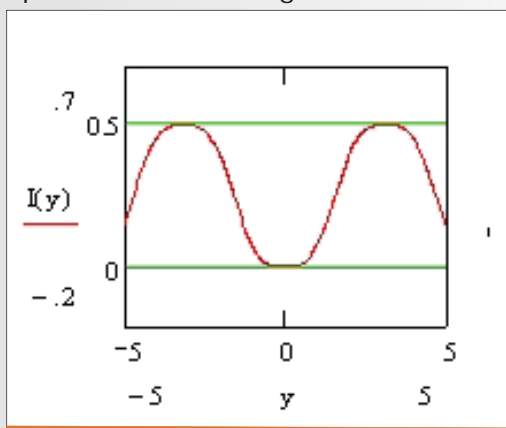


FIGURE 3. SIGNAL FOR THE CHOPPER USED AT 10% BELOW THE WAVELENGTH FOR WHICH IS DESIGNED

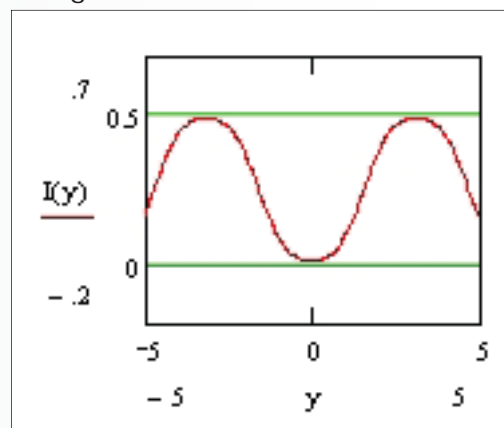


FIGURE 4. SIGNAL FOR THE CHOPPER USED AT 20% BELOW THE WAVELENGTH FOR WHICH IT IS DESIGNED

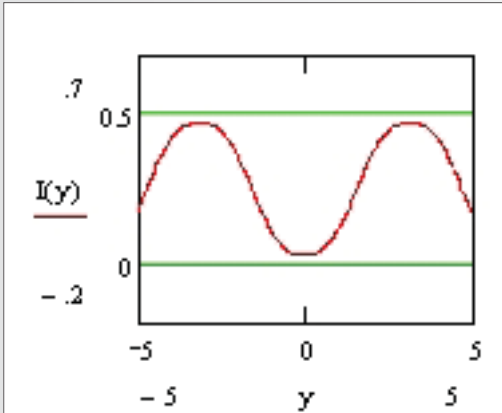


FIGURE 5. SIGNAL FOR THE CHOPPER USED AT 30% BELOW THE WAVELENGTH FOR WHICH IS IS DESIGNED

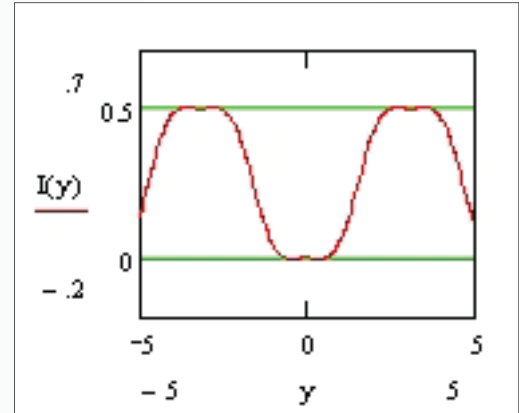


FIGURE 6. SIGNAL FORTHE CHOPPER USED AT 10% ABOVE THE WAVELENGTH FOR WHICH IT IS DESIGNED

From diagrams 3,4 and 5 one can see that the waveform deviates from desirable chopping (figure 1) to a situation in which the signal is not fully on for very long and is never truly off. In the past when we have shown these diagrams to customers they have said that deviation of more than 10% renders the chopping unacceptable.

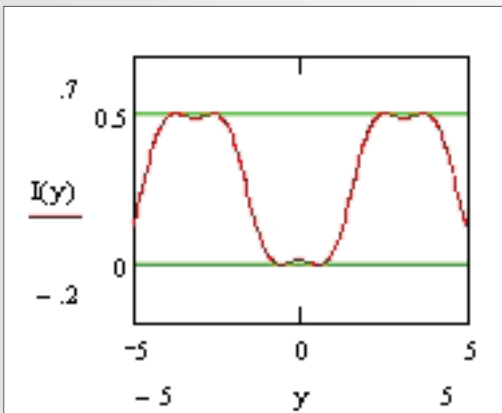


FIGURE 7. SIGNAL FOR THE CHOPPER USED AT 20% ABOVE THE WAVELENGTH FOR WHICH IS IS DESIGNED

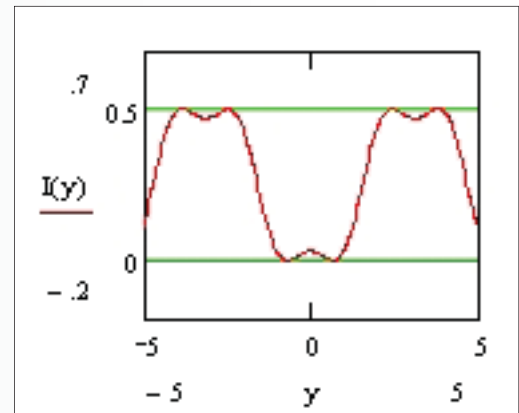


FIGURE 8. SIGNAL FORTHE CHOPPER USED AT 30% ABOVE THE WAVELENGTH FOR WHICH IT IS DESIGNED

Diagrams 6,7 and 8 show that deviation below the wavelength for which the chopper was designed creates a different waveform, but one which is equally unacceptable as a chopper. Again, customers who have seen these diagrams agree that the waveform is unacceptable if it is more than 10% away from the design wavelength.