ERROR ANALYSIS

TABLE 3
Error Analysis, Distances

A	δ_A	B	δ_B	D	δ_D
(m)	(m)	(m)	(m)	(m)	(m)
0.261	0.001	0.451	0.001	11.498	0.05

$(8\pi D^2(Rev/s_{CW}+Rev/s_{CCW}))$ $/((D+B)(s'_{CW}-s'_{CCW}))\ \delta A$	$-(8\pi AD^2(Rev/s_{CW}+Rev/s_{CCW}))$ $/((s'_{CW}-s'_{CCW})(D+B)^2)\ \delta B$	$(8\pi A(Rev/s_{CW}+Rev/s_{CCW})(D(D+2B))$ $/((D+B)^2(s'_{CW}-s'_{CCW}))\ \delta D$
(m/s)	(m/s)	(m/s)
1.160E+06	-2.53E+04	1.37E+06

TABLE 4
Error Analysis, Revolutions

$(Rev)/s_{cw}$	$\delta_{Rev/s\ (CW)}$	$(Rev)/s_{ccw}$	$\delta_{Rev/s\ (CCW)}$	$(8\pi AD^2)$ $/((D+B)(s'_{CW}-s'_{CCW}))\ \delta_{Rev/s(CW)}$	$(8\pi AD^2)$ $/((D+B)(s'_{CW}-s'_{CCW}))\ \delta_{Rev/s(CW)}$
				(m/s)	(m/s)
1500	1	1500	1	1.008E+05	1.008E+05

TABLE 5
Error Analysis, Deflections

s'_{CW}	$\delta_{S\ (CW)}$	s'_{CCW}	$\delta_{S\ (CCW)}$	$-(8\pi AD^2)$ $/((D+B)(s'_{CW}-s'_{CCW}))\ \delta s'_{(CW)}$	$(8\pi AD^2)$ $/((D+B)(s'_{CW}-s'_{CCW}))\ \delta s'_{(CCW)}$
(m)	(m)	(m)	(m)	(m/s)	(m/s)
0.012575	1.00E-05	0.011855	1.00E-05	-4.20E+06	4.20E+06

Table 3 shows that the contribution of A and D's uncertainties are much higher than that of B. However, it would be very hard to improve the uncertainty in A since it is

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already down to within a millimeter. Improving the uncertainty in measuring D could be done by improving the equipment and setup. We found the roll tape measure to be somewhat difficult to use over such a large distance because it would start to droop. We also had to take our measurement over and around some objects in the room. A more precise measuring tool and a clear path would help to improve the uncertainty in A.

Table 4 shows the uncertainties in the revolution measurements of the rotating mirror. These uncertainties are almost impossible to improve as one would need equipment that can measure more precisely than ±1 revolution per second.

Table 5 shows the uncertainties in the deflection measurements. Once again, these uncertainties would be very hard to improve. The uncertainty is based on the smallest measurement one could read off the micrometer, which is already at one-thousandth of a millimeter.

Since we only managed to preform one run, we can not really do a trend analysis of our one point. However, according to the manual, accuracy will improve as D grows larger, until the distance is 10-15m. This means that it is imperative to preform the experiment in this distance range to obtain the best results.

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