Figures 4.2 and 4.3. The acoustic spectrum for laboratory air matches that of [11], with the exceptions of an additional peak at 900 Hz and one less side peak on the second resonance mode. As calculated in § 2.1.2, longitudinal plane-wave modes were observed at the expected acoustic frequencies in laboratory air and nitrous oxide. Interestingly, the acoustic resonances at 900 Hz and 3.3 kHz do not shift between the two gases; this suggests these modes are independent of the speed of sound in the cavity gas. Only the $k = 1$ mode was observed for laboratory air (1.586 kHz observed as compared with 1.65 kHz predicted); both $k = 1$ and $k = 2$ were observed for N$_2$O (1.403 kHz observed versus 1.325 kHz predicted and 2.75 kHz observed versus 2.65 kHz predicted, $k = 1$ and 2, respectively). The weakness of the $k = 2$ mode observed in the acoustic spectrum of N$_2$O reinforces the idea that it is the asymmetric mode with weak coupling to the laser [11]. The range of our chopper frequencies is well below the frequencies of the transverse acoustic modes calculated earlier (Eqn. 2.32); thus we do not expect to see transverse modes in Figures 4.2 and 4.3.