Abstract Submitted for the DAMOP06 Meeting of The American Physical Society

An Interferometric Technique for the Measurement of Acoustic Velocity<sup>1</sup> R. SCHILLER, A. VERNALEKEN<sup>2</sup>, M. G. COHEN, H. METCALF, Physics, Stony Brook University, NY 11794-3800 USA — We have developed a system for accurate measurement of acoustic velocity using an optical phase shifting technique employing acousto-optic modulators (AOMs)<sup>3</sup>. We use a pair of AOMs driven at the same rf frequency but different phase  $\Delta \phi$ . They are aligned to cancel the optical frequency shifts they impose on a laser beam, but they still shift the optical phase by  $\Delta \phi$ . By maintaining  $\Delta \phi$  constant and translating one modulator in the direction of acoustic propagation, a  $2\pi$  optical phase shift is produced for each acoustic wavelength  $\lambda_a$  of translation. The acoustic velocity is the product of this measured  $\lambda_a$  and the known rf frequency. We measure the optical phase shifts by inserting the pair of AOMs into one arm of a Mach-Zehnder interferometer, with one AOM mounted on a micrometer stage, and then detect the fringe shifts. We present results for longitudinal mode velocities in lead molybdate and tellurium dioxide. We will also discuss the importance of refractive index gradients that can produce anomalous results.

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<sup>3</sup>E. Li et al., Opt. Lett. **30**, 189 (2005)

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