

Abstract Submitted  
for the DFD19 Meeting of  
The American Physical Society

**Fiber-Optic Michelson Interferometer System for Shock Speed Measurement in an Expansion Tube** WESLEY YU<sup>1</sup>, JOANNA AUSTIN, California Institute of Technology — Shock speed and time of arrival measurements are necessary to properly characterize the flow in high-enthalpy hypersonic impulse facilities. However, the low density test conditions in expansion tubes present challenges for commonly-used wall-mounted static pressure measurements due to low signal levels relative to the amplitude of stress waves resulting from diaphragm rupture or accelerations from driver operation, and an accurate measurement of shock speed is difficult. A fiber-optic Michelson interferometer architecture is being designed and tested for use in shock speed measurement in the Hypervelocity Expansion Tube (HET) at Caltech. The static and dynamic response of the interferometer is characterized using a pressure vessel and ultrasonic acoustic beam, respectively. Numerical simulations of the interferometer response to a shock wave at experimental conditions, taking into account the structural noise caused by diaphragm opening, indicate that adequate signal-to-noise ratios may be obtained using this technique. This result is encouraging for the development of optical methods to characterize shock speed in impulse facilities with recoil.

<sup>1</sup>Since membership application site is still down, was told to put "Membership Pending" until site is back up

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Date submitted: 26 Jul 2019

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