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Application of interferometry in analyzing gas flow in microchannels[1] YONGLI LI, DAVID NEWPORT, University of Limerick, SHIJU JOSEPH, Unversity of Limerick, JUERGEN J. BRANDNER, Karlsruhe Institute of Technology — Interferometry is a noninvasive measurement and based on this technique, the measurement or visualization of changes in physical properties of transparent objects can be achieved by detecting the refractive index changes. Gas pressure and temperature can be related to their refractive index, so interferometry can be used for local measurement of changes of these properties along the channel. A Mach–Zehnder interferometer was built with a laser with a wavelength of 633 nm, a high speed camera and two acousto-optic modulators (AOMs). Due to small channel characteristic length and sometimes low gas pressure, the measurement could be much influenced by noise. The AOMs can introduce frequency shifts into the system by acousto-optic effect, which can avoid mechanical noise generally by translating piezoelectric mirrors. The channel sides with optical access are made from crystalline silica (Quartz) that does not show speckle effects and any laser absorbance. For initial tests, the local gas pressure drop distribution along microchannel is studied at room temperature.

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Yongli Li
University of Limerick

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