Simulating an Adaptive, Liquid-Filled Membrane Lens with COMSOL Multiphysics® Software

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Abstract

Adaptive optics using liquid filled membrane lens is based on the principle of deflection of polymeric membrane. Controlled deflection in membrane leads to controlled focal length. This makes vibration free, compact and economical optical system. The adjustment of fluid pressure helps to toggle between different field of view at the same time maintaining optimum illumination for each field of view. This system has applications in miniature optics.Some of identified areas include three-dimensional biomedical imaging, optical coherent tomography, target identification in tactical applications in infrared region, and telescope. This paper describes the simulation of liquid filled membrane lens and focusing using fluid pressure regulation.

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Figures used in the abstract

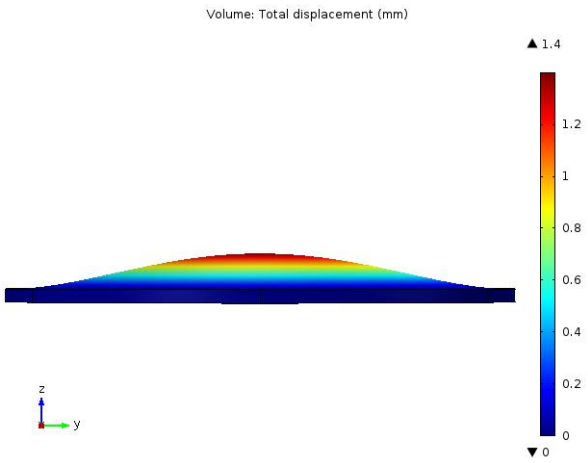

Figure 1: Deflection in 20mm aperture PDMS surface.