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High-speed focus control MEMS deformable mirror with controlled air damping

High speed focus control is useful for optical storage read heads, confocal laser scanning microscopy and optical coherence microscopy. Damping due to viscous air flow is the dominant energy loss mechanism for membranes vibrating over a closely spaced backplate. To control air damping and achieve wide bandwidth actuation, a design with vertical air channels through the backplate is proposed. This project focuses on designing, fabricating and characterizing these proposed MEMS deformable mirrors. Characterizations will be both modeled and experimentally verified. Device designs will be optimized to achieve desirable damping properties with bandwidths over several tens of kilohertz with sub-millisecond settling times. Resulting devices will provide optical instruments with fast focus control properties.