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Performance of an untethered micro-optical pressure sensor[1] TINDARO IOPPOLO, MAURIZIO MANZO, PAUL KRUEGER, Southern Methodist University — We present analytical and computational studies of the performance of a novel untethered micro-optical pressure sensor for fluid dynamics measurements. In particular, resolution and dynamic range will be presented. The sensor concept is based on the whispering galley mode (WGM) shifts that are observed in micro-scale dielectric optical cavities. A micro-spherical optical cavity (liquid or solid) is embedded in a thin polymeric sheet. The applied external pressure perturbs the morphology of the optical cavity leading to a shift in its optical resonances. The optical sensors are interrogated remotely, by embedding quantum dots or fluorescent dye in the micro-optical cavity. This allows a free space coupling of excitation and monitoring of the optical modes without the need of optical fibers or other cabling. With appropriate excitation and monitoring equipment, the micro-scale sensors can be distributed over a surface (e.g., including flexible biological surfaces) to monitor the local pressure field.

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