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**The Vibration of an Inviscid Incompressible Sessile Drop** MARC K. SMITH, Georgia Institute of Technology — The fundamental frequencies and modes of vibration of a free spherical drop of inviscid incompressible fluid were computed 129 years ago by Lord Rayleigh. The analysis was possible because of simplifications resulting from the use of spherical coordinates. These same simplifications don't occur for a sessile drop, i.e., when the drop is supported on a horizontal planar surface, except for the case of a hemispherical drop. The present work describes an integrated analytical and numerical technique for the computation of the fundamental frequencies and modes of vibration of a supported sessile drop. Spherical coordinates are used to describe the interface shape, but the flow field inside the drop is computed numerically using the finite element method. Combining these techniques produces a linear eigenvalue problem that is solved numerically. Results will be presented for sessile drops with different contact angles without gravity and compared to experimental data. This technique can also be extended to sessile drops with gravity, in which the drop shape is flattened, and to substrate geometries that are not planar, such as a drop in a shallow cavity or hole.

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