

3. Theory

A metal ring is hung to a force sensor and is fully immersed in liquid. By gradually pulling up the ring till it breaks away from liquid surface, the force difference between pre- and post-breakaway can be written as:

$$f = \pi(D_1 + D_2)\alpha \quad (1)$$

where D_1 and D_2 are the outer and inner diameters of the ring, respectively; and α is the liquid surface tension coefficient. Then, we get:

$$\alpha = f / [\pi(D_1 + D_2)] \quad (2)$$

In experiment, the force difference f can be acquired as:

$$f = (U_1 - U_2) / B \quad (3)$$

where B is the sensitivity of the sensor in unit of V/N , and U_1 and U_2 are the pre- and post-breakaway readouts of the voltmeter, respectively.