

The special MPT 2 method developed by Fainerman

In this process, a buffer volume is present between the pressure pump and the very narrow measuring capillary. At the capillary tip, very small and stable bubbles are formed and these are detected optically or acoustically when they detach. A special discharge tip ensures that the individual bubbles are generated with constant volume during all the measuring process. In contrast to the pressure in the bubble which is technically difficult to measure, the pressure in the buffer volume is independent of the bubble status and is always equal to the maximum bubble pressure. In a test with pure water, the pressure in the buffer volume, measured against the flow rate, shows a slope change which is caused by the transition between the continual jet flow and the formation of discrete bubbles. At this point, the bubble lamellae close extremely rapidly (ultra-short bubble life). The measuring program detects the transition point and determines the critical parameters: Pressure P_C and Gas flow L_C .

From this, taking into account the time measured between the individual bubbles (bubble time), the measuring point time and dead time until bubble detachment for all measuring points can be determined.

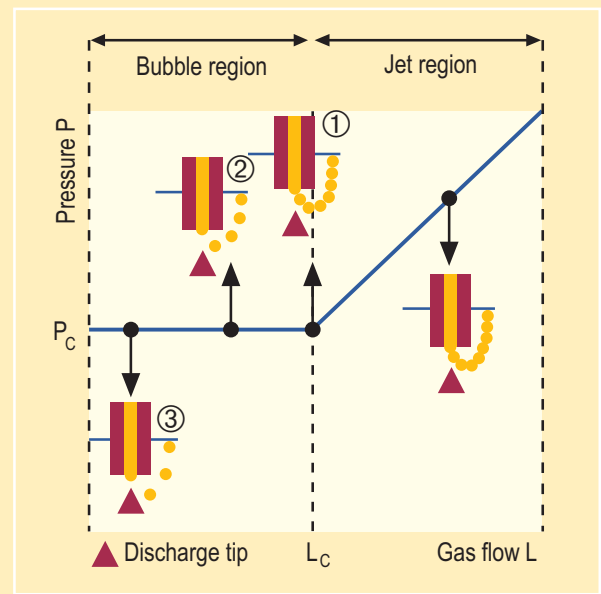
There are measuring points directly at the transition point, where direct detection of the bubble time is not possible. By using the Fainerman method developed for the MPT 2, the exact surface age can also be determined for these bubbles from the measured flow rate and the fixed bubble volume.

Calculation of bubble life time according to Fainerman:

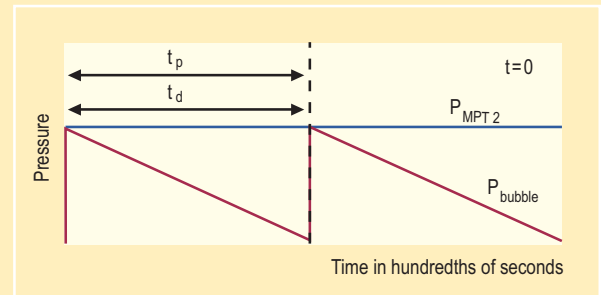
$$t = t_p - t_d$$

$$t_d = \frac{t_p (P_C \cdot L)}{L_C \cdot P}$$

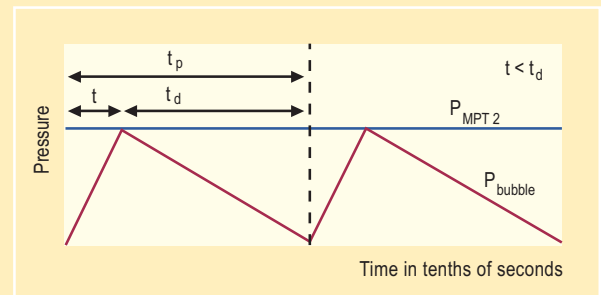
As the diagram shows, the ratio between the bubble life and dead time increases when bubble formation is slower. Thus, the dead time is not proportional to the bubble time.



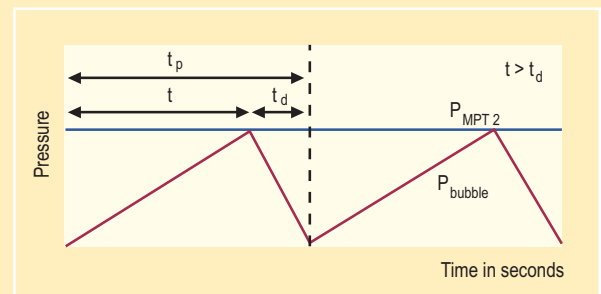
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The larger the period between the bubbles, the smaller the portion of time t_d for the release process in the bubble life.

t : bubble formation time till hemispherical form (bubble life)

t_p : time between two bubbles (bubble period) · t_d : time till release of bubble (dead time)