Champagne! (10 points)

Part A. Nucleation, growth and rise of bubbles

A.1 (0.2pt)

$P_b =$

A.2 (0.5pt)

$a_c =$

Numerical value of $a_c =$

A.3 (1.2pt)

$n_c =$

Model (1) $a(t) =$

Model (2) $a(t) =$

Model chosen:

Numerical value of $K =$

Numerical value of $D =$

A.4 (0.8pt)

Forces on the bubble:

$v(a) =$

Numerical value of $\eta =$

A.5 (0.5pt)

$a_{H_\ell} =$

Numerical value of $a_{H_\ell} =$

A.6 (1.1pt)

Differential equation for $c_\ell(t)$:

$\tau =$

Part B. Acoustic emission of a bursting bubble

B.1 (1.1pt)

$v_\mathrm{f} =$

B.2 (1.1pt)

$f_0 =$

B.3 (1.1pt)

Numerical value of $a =$

Numerical value of $h =$

Part C. Popping champagne

C.1 (0.4pt)

For $T_0 = 6\,^\circ\mathrm{C}$, numerical value of $P_\mathrm{i} =$

For $T_0 = 20\,^\circ\mathrm{C}$, numerical value of $P_\mathrm{i} =$

C.2 (0.7pt)

If $T_0 = 6\,°\mathrm{C}$, numerical value of $T_\mathrm{f} =$

If $T_0 = 20\,°\mathrm{C}$, numerical value of $T_\mathrm{f} =$

True statements (numbers):

C.3 (1.3pt)

Numerical value of $H_\mathrm{c} =$