at the bubble wall. P_∞ is the pressure at infinity, m is a constant associated with the liquid ($m = 7$ for water). P and ρ are related by the equation of state [5]:

$$P = A(\frac{\rho}{\rho_0})^m - B, \tag{5}$$

where ρ_0 is the equilibrium density of the liquid, A and B are constants associated with the liquid.

The pressure at infinity P_∞ is given by:

$$P_\infty = P_0 - P_n sin(2\pi f_d t), \tag{6}$$

where f_d is the acoustic driving frequency and P_n is the forcing pressure amplitude.

Depending on the assumptions that are made, different expressions for P(R) may be obtained and lead to different versions of (2). In the context of this publication, (2) was solved using the following expressions for the pressure at the bubble wall, and P_g is the pressure of the gas within the bubble respectively [6]:

$$P(R) = P_g + P_V - \frac{2\sigma}{\mathrm{R}} - \frac{4\mu}{\mathrm{R}}U, \tag{7}$$

with

$$P_g = (P_0 - P_V + \frac{2\sigma}{\mathrm{R}_0})(\frac{\mathrm{R}_0}{\mathrm{R}})^{3\gamma}, \tag{8}$$

where P_V is the partial pressure of water vapour in air ($P_V = 2.3kPa$), P_g is the pressure of the gas within the bubble, μ is the kinematic viscosity ($\mu = 10^{-3}$Pa s).

Eq. (2)-(8) constitute a set of coupled nonlinear differential equations that have been solved numerically using a fourth order Runge-Kutta algorithm with an adaptive step size. Results have been produced for the variation of the bubble radius with time. The initial conditions imposed on the differential equation solver at t=0 were R=R_0 and U=0.

The pressure radiated from the bubble, at a distance r from its center and at time t, may then be obtained from [5]:

$$p(r,t) = A[\frac{2}{\mathrm{m}+1} + \frac{\mathrm{m}-1}{\mathrm{m}+1}(1 + \frac{\mathrm{m}+1}{\mathrm{r}c_0^2}G(t))^{\frac{1}{2}}]^{\frac{2\mathrm{m}}{\mathrm{m}-1}} - B, \tag{9}$$