$$k_n = \frac{n\pi}{L}$$

$$\omega_n^2 = \frac{g_0 k_n \left(\rho_2 - \rho_1\right)}{\rho_1 \coth\left(\omega_{2n+1} t\right) + \rho_2 \coth\left(k_{2n+1} x\right)}$$

$$y\left(x,\, t\right) = h_2 + \frac{a}{g_0}\left[x - \frac{L}{2} + \sum_{n=0}^{\infty} \frac{4}{L k_{2n+1}^2} \cos\left(\omega_{2n+1} t\right) \cos\left(k_{2n+1} x\right)\right]$$