

$$\begin{array}{l} L \\ R_0 \\ H \\ R(t) = R_0 + y(t) \end{array}$$

$$\begin{array}{l} y(t) \\ t \\ d^2y(t)dt^2+\beta dy(t)dt+\alpha y(t)=\gamma(p(t)-p_0) \end{array}$$

$$\begin{array}{l} (2) \\ \alpha = E\rho_w R_0^2 \quad \gamma = 1\rho_w H \quad \beta = > 0 \end{array}$$

$$\begin{array}{l} (3) \\ x \\ t \end{array}$$

$$\begin{array}{l} (p-p_0)=x\Delta p\left(a+b\cos(\omega_0t)\right) \\ (4) \end{array}$$

$$\begin{array}{l} ?? \\ L\ 5\times10^{-2}\ b\ 133.32^{-2} \\ R_0 5\times10^{-3}\ a\ 1333.2^{-2} \\ \rho_w 1\times10^{3-3}\ \Delta p 33.33^{-2} \\ H\ 3\times10^{-4}\ w_0\ 2\pi/0.8 \\ E\ 9\times10^{5-2} \\ \beta \\ \beta = \\ \sqrt{\alpha} \\ \beta = \\ \alpha \\ ?? \end{array}$$

$$\begin{array}{l} \vec{y}'(t)=A\vec{y}+\vec{b} \\ (5) \end{array}$$

$$\begin{array}{l} \vec{y} = \\ y y'^T \\ T \\ b(t) \\ t \\ A \end{array}$$

$$\begin{array}{l} A = (0)1-\alpha-\beta \\ (6) \\ A \end{array}$$

$$\begin{array}{l} det(A-\lambda I)=-\lambda 1-\alpha-\lambda-\beta\rightarrow \alpha\lambda^2+\beta\lambda+1=0 \\ (7) \end{array}$$

$$\begin{array}{l} \lambda_{1,2}=(-\beta\pm\sqrt{\beta^2-4\alpha})2 \\ (8) \end{array}$$

$$\begin{array}{l} \beta \geq \\ 2\sqrt{\alpha} \\ \lambda_1 \\ \lambda_2 \\ \beta < \\ 2\sqrt{\alpha} \\ A \\ ?? \\ \beta = \\ \sqrt{\alpha} = \\ 6.0\times \\ 10^3 \end{array}$$

$$\begin{array}{l} A=(0)136.0\times10^66.0\times10^3\rightarrow \lambda_1=-3000.00+5196.15i\lambda_2=-3000.00-5196.15i \\ (9) \end{array}$$

$$\begin{array}{l} \beta = \\ 36.0\times \\ 10^6 \end{array}$$

$$\begin{array}{l} A=(0)136.0\times10^636.0\times10^6\rightarrow \lambda_1=-1.0\lambda_2=-36.0\times10^6 \\ (10) \end{array}$$

$$\begin{array}{l} ?? \\ \beta \\ y(x,t)= \\ y_j^n \\ \partial y/\partial t(x,t)= \\ z_j^n \\ ?? \end{array}$$