$$
\begin{aligned}
m_1\ddot{z}_1 + c_1(\dot{z}_1 - \dot{z}_2) + k_1(z_1 - z_2) &= 0,\\
m_2\ddot{z}_2 + c_1(\dot{z}_2 - \dot{z}_1) + c_2(\dot{z}_2 - \dot{h}) + k_1(z_2 - z_1) + k_2(z_2 - h) &= 0.
\end{aligned}
$$

$$
\begin{aligned}
\dot{z}_1 &= z_3,\\
\dot{z}_2 &= z_4,\\
\dot{z}_3 &= \frac{1}{m_1}\Big(- k_1 z_1 + k_1 z_2 - c_1 z_3 + c_1 z_4\Big),\\
\dot{z}_4 &= \frac{1}{m_2}\Big(k_1 z_1 - (k_1 + k_2) z_2 + c_1 z_3 - (c_1 + c_2) z_4 + k_2 h + c_2 \dot{h}\Big).
\end{aligned}
$$

$$
\frac{d}{dt}\begin{pmatrix} z_1\\ z_2\\ z_3\\ z_4 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 1 & 0\\ 0 & 0 & 0 & 1\\ -k_1/m_1 & k_1/m_1 & -c_1/m_1 & c_1/m_1\\ k_1/m_2 & -(k_1+k_2)/m_2 & c_1/m_2 & -(c_1+c_2)/m_2 \end{pmatrix} \begin{pmatrix} z_1\\ z_2\\ z_3\\ z_4 \end{pmatrix} + \begin{pmatrix} 0\\ 0\\ 0\\ (k_2 h + c_2\dot{h})/m_2 \end{pmatrix}.
$$

$$
h(t) = \begin{cases} \frac{H}{2}\left(1 - \cos\left(\frac{2\pi u t}{L}\right)\right), & t \le \frac{L}{u},\\ 0, & t > \frac{L}{u}. \end{cases}
$$

$$
\dot{h}(t) = \begin{cases} \frac{H}{2}\frac{2\pi u}{L}\sin\left(\frac{2\pi u t}{L}\right), & t \le \frac{L}{u},\\ 0, & t > \frac{L}{u}. \end{cases}
$$

$$
\mathbf{g}(t) = \begin{cases} \begin{pmatrix} 0\\ 0\\ 0\\ \frac{k_2}{m_2}\frac{H}{2}\left(1 - \cos\left(\frac{2\pi u t}{L}\right)\right) + \frac{c_2}{m_2}\frac{H}{2}\frac{2\pi u}{L}\sin\left(\frac{2\pi u t}{L}\right) \end{pmatrix}, & t \le \frac{L}{u},\\ \begin{pmatrix} 0\\ 0\\ 0\\ 0 \end{pmatrix}, & t > \frac{L}{u}. \end{cases}
$$