

$$\begin{aligned}
H &= \begin{bmatrix} M\partial_{x_1} & -\partial_{x_1} & -\partial_{x_2} \\ -\partial_{x_1} & M\partial_{x_1} & 0 \\ -\partial_{x_2} & 0 & M\partial_{x_1} \end{bmatrix} \\
(x, y) &= (p(x, t), v_x(x, t), v_y(x, t))
\end{aligned}$$