

$$\text{In[1]:= Eigensystem}\left[\begin{pmatrix} 0 & -\mathbf{I} \, \mathbf{d} \, \mathbf{k} \mathbf{x} & -\mathbf{g} & -\mathbf{I} \, \mathbf{g} \\ \mathbf{I} \, \mathbf{d} \, \mathbf{k} \mathbf{x} & 0 & -\mathbf{I} \, \mathbf{g} & \mathbf{g} \\ -\mathbf{g} & \mathbf{I} \, \mathbf{g} & 0 & -\mathbf{I} \, \mathbf{d} \, \mathbf{k} \mathbf{x} \\ \mathbf{I} \, \mathbf{g} & \mathbf{g} & \mathbf{I} \, \mathbf{d} \, \mathbf{k} \mathbf{x} & 0 \end{pmatrix}\right]$$

$$\begin{aligned} \text{Out[1]= } & \left\{ \left\{ -\mathbf{d} \, \mathbf{k} \mathbf{x}, \mathbf{d} \, \mathbf{k} \mathbf{x}, -\sqrt{4 \, \mathbf{g}^2 + \mathbf{d}^2 \, \mathbf{k} \mathbf{x}^2}, \sqrt{4 \, \mathbf{g}^2 + \mathbf{d}^2 \, \mathbf{k} \mathbf{x}^2} \right\}, \left\{ \{\mathbf{i}, 1, 0, 0\}, \{0, 0, -\mathbf{i}, 1\}, \right. \right. \\ & \left\{ \frac{\mathbf{i} \left(2 \, \mathbf{g}^2 + \mathbf{d}^2 \, \mathbf{k} \mathbf{x}^2 - \mathbf{d} \, \mathbf{k} \mathbf{x} \sqrt{4 \, \mathbf{g}^2 + \mathbf{d}^2 \, \mathbf{k} \mathbf{x}^2} \right)}{\mathbf{g} \left(-\mathbf{d} \, \mathbf{k} \mathbf{x} + \sqrt{4 \, \mathbf{g}^2 + \mathbf{d}^2 \, \mathbf{k} \mathbf{x}^2} \right)}, -\frac{2 \, \mathbf{g}^2 + \mathbf{d}^2 \, \mathbf{k} \mathbf{x}^2 - \mathbf{d} \, \mathbf{k} \mathbf{x} \sqrt{4 \, \mathbf{g}^2 + \mathbf{d}^2 \, \mathbf{k} \mathbf{x}^2}}{\mathbf{g} \left(-\mathbf{d} \, \mathbf{k} \mathbf{x} + \sqrt{4 \, \mathbf{g}^2 + \mathbf{d}^2 \, \mathbf{k} \mathbf{x}^2} \right)}, \mathbf{i}, 1 \right\}, \\ & \left. \left\{ -\frac{\mathbf{i} \left(2 \, \mathbf{g}^2 + \mathbf{d}^2 \, \mathbf{k} \mathbf{x}^2 + \mathbf{d} \, \mathbf{k} \mathbf{x} \sqrt{4 \, \mathbf{g}^2 + \mathbf{d}^2 \, \mathbf{k} \mathbf{x}^2} \right)}{\mathbf{g} \left(\mathbf{d} \, \mathbf{k} \mathbf{x} + \sqrt{4 \, \mathbf{g}^2 + \mathbf{d}^2 \, \mathbf{k} \mathbf{x}^2} \right)}, -\frac{-2 \, \mathbf{g}^2 - \mathbf{d}^2 \, \mathbf{k} \mathbf{x}^2 - \mathbf{d} \, \mathbf{k} \mathbf{x} \sqrt{4 \, \mathbf{g}^2 + \mathbf{d}^2 \, \mathbf{k} \mathbf{x}^2}}{\mathbf{g} \left(\mathbf{d} \, \mathbf{k} \mathbf{x} + \sqrt{4 \, \mathbf{g}^2 + \mathbf{d}^2 \, \mathbf{k} \mathbf{x}^2} \right)}, \mathbf{i}, 1 \right\} \right\} \end{aligned}$$