Structure of pHs RLC

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1 System netlist

line	label	dictionary.component	nodes	parameters
ℓ_1	IN	electronics.source	('A', 'ref')	{ type voltage
ℓ_2	R1	electronics.resistor	('A', 'B')	{ R ('R1', 1000.0)
ℓ_3	L	electronics.inductor	('B', 'C')	{ L ('L', 0.05)
ℓ_4	C	electronics.capacitor	('C', 'ref')	{ C ('C', 2e-06)

$\dim(\mathbf{x}) = n_{\mathbf{x}} = 2$;
$\dim(\mathbf{w}) = n_{\mathbf{w}} = 1$;
$\dim(\mathbf{y}) = n_{\mathbf{y}} = 1$;
$\dim(\mathbf{p}) = n_{\mathbf{p}} = 0$;

2 System variables

State variable $\mathbf{x} = \begin{pmatrix} x_{\mathrm{L}} \\ x_{\mathrm{C}} \end{pmatrix}$;
Dissipation variable $\mathbf{w} = \begin{pmatrix} w_{\mathrm{R1}} \end{pmatrix}$;
Input $\mathbf{u} = \begin{pmatrix} u_{\mathrm{IN}} \end{pmatrix}$;

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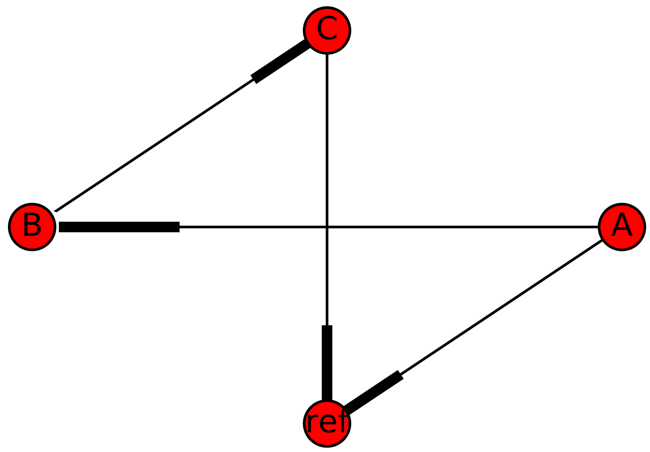

Figure 1: Graph of system RLC.

Output $\mathbf{y} = \begin{pmatrix} y_{\mathrm{IN}} \end{pmatrix}$;

3 Constitutive relations

Hamiltonian $\mathtt{H}(\mathbf{x}) = \frac{0.5}{\mathrm{L}} \cdot x_{\mathrm{L}}^2 + \frac{0.5}{\mathrm{C}} \cdot x_{\mathrm{C}}^2$;
Hamiltonian gradient $\nabla\mathtt{H}(\mathbf{x}) = \begin{pmatrix} \frac{x_{\mathrm{L}}}{\mathrm{L}} \\ \frac{x_{\mathrm{C}}}{\mathrm{C}} \end{pmatrix}$;
Dissipation function $\mathbf{z}(\mathbf{w}) = \begin{pmatrix} \mathrm{R1} \cdot w_{\mathrm{R1}} \end{pmatrix}$;
Jacobian of dissipation function $\mathcal{J}_{\mathbf{z}}(\mathbf{w}) = \begin{pmatrix} \mathrm{R1} \end{pmatrix}$;

4 System parameters

4.1 Constant

parameter	value (SI)
C :	2e-06
R1 :	1000.0
L :	0.05

$$\mathbf{M} = \begin{pmatrix} 0 & -1.0 & -1.0 & 1.0 \\ 1.0 & 0 & 0 & 0 \\ 1.0 & 0 & 0 & 0 \\ -1.0 & 0 & 0 & 0 \end{pmatrix};$$

$$\mathbf{J} = \begin{pmatrix} 0 & -1.0 & -1.0 & 1.0 \\ 1.0 & 0 & 0 & 0 \\ 1.0 & 0 & 0 & 0 \\ -1.0 & 0 & 0 & 0 \end{pmatrix};$$

$$\mathbf{R} = \begin{pmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix};$$