

In[1]:= **Clear**["Global\*`"];

清除

**q1** = **θ1**[**t**];

**q2** = **θ2**[**t**];

**xg** = **f**[**t**];

In[5]:= **V1** = {**∂<sub>t</sub>****xg** + **L1** **∂<sub>t</sub>****q1** **Cos**[**q1**], **L1** **∂<sub>t</sub>****q1** **Sin**[**q1**]};

余弦

正弦

**V2** = **V1** + {**L2** **∂<sub>t</sub>****q2** **Cos**[**q2**], **L2** **∂<sub>t</sub>****q2** **Sin**[**q2**]};

余弦

正弦

In[7]:= **T** =  $\frac{1}{2}$  **m1** **Dot**[**V1**, **V1**] +  $\frac{1}{2}$  **m2** **Dot**[**V2**, **V2**] // **FullSimplify**;

点积

点积

完全简化

**T** // **TraditionalForm**

传统格式

Out[8]//TraditionalForm=

$$\frac{1}{2} \left( m1 \left( 2 L1 f'(t) \theta_1'(t) \cos(\theta_1(t)) + f'(t)^2 + L1^2 \theta_1'(t)^2 \right) + m2 \left( (f'(t) + L1 \theta_1'(t) \cos(\theta_1(t)) + L2 \theta_2'(t) \cos(\theta_2(t)))^2 + (L1 \theta_1'(t) \sin(\theta_1(t)) + L2 \theta_2'(t) \sin(\theta_2(t)))^2 \right) \right)$$

In[9]:= **V** = -**m1** **g** **Cos**[**q1**] **L1** - **m2** **g** (**L1** **Cos**[**q1**] + **L2** **Cos**[**q2**]) // **FullSimplify**;

余弦

余弦

余弦

完全简化

**V** // **TraditionalForm**

传统格式

Out[10]//TraditionalForm=

$$-g (L1 (m1 + m2) \cos(\theta_1(t)) + L2 m2 \cos(\theta_2(t)))$$

In[11]:= **L** = **T** - **V** // **FullSimplify**;

完全简化

**L** // **TraditionalForm**

传统格式

Out[12]//TraditionalForm=

$$\frac{1}{2} \left( (m1 + m2) \left( 2 L1 f'(t) \theta_1'(t) \cos(\theta_1(t)) + f'(t)^2 + L1^2 \theta_1'(t)^2 \right) + 2 L2 m2 \theta_2'(t) (f'(t) \cos(\theta_2(t)) + L1 \theta_1'(t) \cos(\theta_1(t) - \theta_2(t))) + L2^2 m2 \theta_2'(t)^2 \right) + g L1 (m1 + m2) \cos(\theta_1(t)) + g L2 m2 \cos(\theta_2(t))$$

In[13]:= **eq1** = **∂<sub>t</sub>** (**∂<sub>(∂<sub>t</sub>q1)</sub>** **L**) - **∂<sub>q1</sub>** **L** == **0** // **FullSimplify**;

完全简化

**eq1** // **TraditionalForm**

传统格式

Out[14]//TraditionalForm=

$$L1 \left( (m1 + m2) (f''(t) \cos(\theta_1(t)) + g \sin(\theta_1(t)) + L1 \theta_1''(t)) + L2 m2 \theta_2''(t) \cos(\theta_1(t) - \theta_2(t)) + L2 m2 \theta_2'(t)^2 \sin(\theta_1(t) - \theta_2(t)) \right) = 0$$

In[15]:= **eq2** = **∂<sub>t</sub>** (**∂<sub>(∂<sub>t</sub>q2)</sub>** **L**) - **∂<sub>q2</sub>** **L** == **0** // **FullSimplify**;

完全简化

**eq2** // **TraditionalForm**

传统格式

Out[16]//TraditionalForm=

$$L2 m2 (f''(t) \cos(\theta_2(t)) + g \sin(\theta_2(t)) + L1 \theta_1''(t) \cos(\theta_1(t) - \theta_2(t)) - L1 \theta_1'(t)^2 \sin(\theta_1(t) - \theta_2(t)) + L2 \theta_2''(t)) = 0$$