$$\frac{\partial \mathcal{L}}{\partial x} = mg \sin \alpha - \frac{1}{2} mg \cos \alpha \left(1 - \cos \theta\right) \left(\frac{\frac{x}{l} + \sin \varphi_{10}}{\sqrt{1 - \left(\frac{x}{l} + \sin \varphi_{10}\right)^2}} + \frac{\frac{x}{l} + \sin \varphi_{20}}{\sqrt{1 - \left(\frac{x}{l} + \sin \varphi_{20}\right)^2}}\right)$$

$$+\frac{k}{l} + \frac{\beta - \arcsin\left(\frac{x}{l}\sin\varphi_{10}\right)}{\sqrt{1 - \left(\frac{x}{l} + \sin\varphi_{10}\right)^{2}}} + \frac{\beta - \arcsin\left(\frac{x}{l}\sin\varphi_{20}\right)}{\sqrt{1 - \left(\frac{x}{l} + \sin\varphi_{20}\right)^{2}}} \\ + \frac{\left(-\beta + \arccos\left(\sqrt{1 - \left(\frac{x}{l} + \sin\varphi_{10}\right)^{2}}\right) + \frac{x}{l}\tan\theta\right)\left(-\frac{\frac{x}{l}\sin\varphi_{10}}{\sqrt{1 - \left(\frac{x}{l} + \sin\varphi_{10}\right)^{2}}} + \tan\theta\right)}{\sqrt{1 - \left(\sqrt{1 - \left(\frac{x}{l} + \sin\varphi_{10}\right)^{2}} + \frac{x\tan\theta}{l}\right)^{2}}}\right)$$

$$-rac{1}{4}ml\Biggl(rac{rac{x}{l}\sinarphi_{10}}{\sqrt{1-\Bigl(rac{x}{l}+\sinarphi_{10}\Bigr)^2}}+rac{rac{x}{l}\sinarphi_{20}}{\sqrt{1-\Bigl(rac{x}{l}+\sinarphi_{20}\Bigr)^2}}\Biggr)\Biggl(\sqrt{1-\Bigl(rac{x}{l}+\sinarphi_{10}\Bigr)^2}+\sqrt{1-\Bigl(rac{x}{l}+\sinarphi_{20}\Bigr)^2}\Biggr)\Biggr$$