rg1

$$(\frac{l\sin(\theta)}{2} - l\cos(\beta))\hat{\mathbf{r}}_\mathbf{x} + (-l\sin(\beta) - \frac{l\cos(\theta)}{2})\hat{\mathbf{r}}_\mathbf{y} \tag{1}$$

rg2

$$(\frac{l\sin(\phi)}{2} + l\cos(\beta))\hat{\mathbf{r}}_\mathbf{x} + (l\sin(\beta) - \frac{l\cos(\phi)}{2})\hat{\mathbf{r}}_\mathbf{y} \tag{2}$$

vg1

$$(l\sin(\beta)\,\dot{\beta} + \frac{l\cos(\theta)\,\dot{\theta}}{2})\hat{\mathbf{r}}_\mathbf{x} + (\frac{l\sin(\theta)\,\dot{\theta}}{2} - l\cos(\beta)\,\dot{\beta})\hat{\mathbf{r}}_\mathbf{y} \tag{3}$$

vg2

$$(-l\sin(\beta)\,\dot{\beta} + \frac{l\cos(\phi)\,\dot{\phi}}{2})\hat{\mathbf{r}}_\mathbf{x} + (\frac{l\sin(\phi)\,\dot{\phi}}{2} + l\cos(\beta)\,\dot{\beta})\hat{\mathbf{r}}_\mathbf{y} \tag{4}$$

ag1

$$(l\sin(\beta)\,\ddot{\beta} - \frac{l\sin(\theta)\,\dot{\theta}^2}{2} + l\cos(\beta)\,\dot{\beta}^2 + \frac{l\cos(\theta)\,\ddot{\theta}}{2})\hat{\mathbf{r}}_\mathbf{x} + (l\sin(\beta)\,\dot{\beta}^2 + \frac{l\sin(\theta)\,\ddot{\theta}}{2} - l\cos(\beta)\,\ddot{\beta} + \frac{l\cos(\theta)\,\dot{\theta}^2}{2})\hat{\mathbf{r}}_\mathbf{y} \tag{5}$$

ag2

$$(-l\sin(\beta)\,\ddot{\beta} - \frac{l\sin(\phi)\,\dot{\phi}^2}{2} - l\cos(\beta)\,\dot{\beta}^2 + \frac{l\cos(\phi)\,\ddot{\phi}}{2})\hat{\mathbf{r}}_\mathbf{x} + (-l\sin(\beta)\,\dot{\beta}^2 + \frac{l\sin(\phi)\,\ddot{\phi}}{2} + l\cos(\beta)\,\ddot{\beta} + \frac{l\cos(\phi)\,\dot{\phi}^2}{2})\hat{\mathbf{r}}_\mathbf{y} \tag{6}$$

ag1

$$\frac{\sqrt{l^2\left(4\sin(\beta(t)-\theta(t))\frac{d}{dt}\beta(t)\frac{d}{dt}\theta(t) + 4\left(\frac{d}{dt}\beta(t)\right)^2 + \left(\frac{d}{dt}\theta(t)\right)^2\right)}}{2} \tag{7}$$

ag2

$$\frac{\sqrt{l^2\left(-4\sin(\beta(t)-\phi(t))\frac{d}{dt}\beta(t)\frac{d}{dt}\phi(t) + 4\left(\frac{d}{dt}\beta(t)\right)^2 + \left(\frac{d}{dt}\phi(t)\right)^2\right)}}{2} \tag{8}$$

VL kropp 1

$$-\frac{glm_1\sin(\theta)}{2}\hat{\mathbf{r}}_\mathbf{z} \tag{9}$$

HL kropp 1

$$(\frac{l^2m_1\left(2\sin(\beta-\theta)\,\ddot{\beta} + 2\cos(\beta-\theta)\,\dot{\beta}^2 + \ddot{\theta}\right)}{4} + \frac{l^2m_1\ddot{\theta}}{12})\hat{\mathbf{r}}_\mathbf{z} \tag{10}$$

VL kropp 2

$$-\frac{glm_2\sin(\phi)}{2}\hat{\mathbf{r}}_\mathbf{z} \tag{11}$$

HL kropp 2

$$(\frac{l^2m_2\left(-2\sin(\beta-\phi)\,\ddot{\beta} - 2\cos(\beta-\phi)\,\dot{\beta}^2 + \ddot{\phi}\right)}{4} + \frac{l^2m_2\ddot{\phi}}{12})\hat{\mathbf{r}}_\mathbf{z} \tag{12}$$

Kropp 1

$$\frac{glm_1\sin(\theta(t))}{2} = -\frac{l^2m_1\left(3\sin(\beta(t)-\theta(t))\frac{d^2}{dt^2}\beta(t) + 3\cos(\beta(t)-\theta(t))\left(\frac{d}{dt}\beta(t)\right)^2 + 2\frac{d^2}{dt^2}\theta(t)\right)}{6} \tag{13}$$

Kropp 2

$$\frac{glm_2\sin(\phi(t))}{2} = -\frac{l^2m_2\left(-3\sin(\beta(t)-\phi(t))\frac{d^2}{dt^2}\beta(t) - 3\cos(\beta(t)-\phi(t))\left(\frac{d}{dt}\beta(t)\right)^2 + 2\frac{d^2}{dt^2}\phi(t)\right)}{6} \tag{14}$$

Hela kroppen VL

$$gl\,(m_1 - m_2)\cos(\beta)\,\hat{\mathbf{r}}_\mathbf{z} \tag{15}$$

Hela kroppen HL

$$\frac{l^2\left(m_1\sin(\beta-\theta)\,\ddot{\theta} - m_1\cos(\beta-\theta)\,\dot{\theta}^2 + 2m_1\ddot{\beta} - m_2\sin(\beta-\phi)\,\ddot{\phi} + m_2\cos(\beta-\phi)\,\dot{\phi}^2 + 2m_2\ddot{\beta}\right)}{2}\hat{\mathbf{r}}_\mathbf{z} \tag{16}$$