c) $s=\int_0^{\frac{2\pi}{\omega}} |v(t)|\,dt \to \int_0^{\frac{2\pi}{\omega}} \sqrt{8R^2\omega^2(1+\cos(3\omega t)}\,dt$

$$= \left[\sqrt{8R^2\omega^2(1+\cos(3\omega t)}\,t\right]_0^{\frac{2\pi}{\omega}} = \sqrt{8R^2\omega^2(1+\cos(3\omega t)}\,\frac{2\pi}{\omega}$$

$$s=|v(t)|\cdot t \iff t=\frac{s}{|v(t)|}$$

$$\vec{T}=\frac{d\vec{r}(s)}{ds} \qquad \vec{n}=\frac{\frac{dT(s)}{ds}}{\left|\frac{dT}{ds}\right|}=\frac{1}{k}\frac{dT}{ds}$$

$$r(s)=2R\begin{pmatrix}\cos\left(\frac{\omega s}{|v(t)|}\right)-\cos^2\left(\frac{\omega s}{|v(t)|}\right)\\ \sin\left(\frac{\omega s}{|v(t)|}\right)-\sin\left(\frac{\omega s}{|v(t)|}\right)\cdot\cos\left(\frac{\omega s}{|v(t)|}\right)\end{pmatrix}$$

$$\frac{dr(s)}{ds}=2R\begin{pmatrix}-\frac{\omega}{|v(t)|}\sin\left(\frac{\omega s}{|v(t)|}\right)+\frac{2\omega\sin\left(\frac{\omega s}{|v(t)|}\right)}{|v(t)|}\cdot\cos\left(\frac{\omega s}{|v(t)|}\right)\\ \frac{\omega}{|v(t)|}\cos\left(\frac{\omega s}{|v(t)|}\right)-\frac{\omega}{|v(t)|}\cos^2\left(\frac{\omega s}{|v(t)|}\right)+\frac{\omega}{|v(t)|}\sin^2\left(\frac{\omega s}{|v(t)|}\right)\end{pmatrix}$$ Hinwei

$$\frac{dr(s)}{ds}=\frac{2r\omega}{|v(t)|}\begin{pmatrix}-\sin\left(\frac{\omega s}{|v(t)|}\right)+\sin\left(2\frac{\omega s}{|v(t)|}\right)\\ \cos\left(\frac{\omega s}{|v(t)|}\right)+\cos\left(2\frac{\omega s}{|v(t)|}\right)\end{pmatrix}$$ -1 rausge

+ Hinwe

$$\vec{e_T}(s)=\frac{2R\omega}{|v(t)|}\begin{pmatrix}-\sin\left(\frac{\omega s}{|v(t)|}\right)+\sin\left(2\frac{\omega s}{|v(t)|}\right)\\ \cos\left(\frac{\omega s}{|v(t)|}\right)+\cos\left(2\frac{\omega s}{|v(t)|}\right)\end{pmatrix}$$

$$k=\left|\frac{eT(s)}{ds}\right|$$

$$=\frac{2R\omega}{|v(t)|}\begin{pmatrix}-\frac{\omega}{|v(t)|}\cos\left(\frac{\omega s}{|v(t)|}\right)+\frac{2\omega}{|v(t)|}\cos\left(2\frac{\omega s}{|v(t)|}\right)\\ -\frac{\omega}{|v(t)|}\sin\left(\frac{\omega s}{|v(t)|}\right)-\frac{2\omega}{|v(t)|}\sin\left(2\frac{\omega s}{|v(t)|}\right)\end{pmatrix}$$

$$=\frac{2R\omega^2}{|v(t)|^2}\begin{pmatrix}-\cos\left(\frac{\omega s}{|v(t)|}\right)+2\cos\left(2\frac{\omega s}{|v(t)|}\right)\\ -\sin\left(\frac{\omega s}{|v(t)|}\right)-2\sin\left(2\frac{\omega s}{|v(t)|}\right)\end{pmatrix}$$

A1)

$$\left|\frac{d\vec{e}(s)}{ds}\right| = \sqrt{\frac{4R^2w^4}{|v(t)|^4}\Big(\Big(\cos^2\big(\tfrac{ws}{|v(t)|}\big) - 4\cos\big(\tfrac{ws}{|v(t)|}\big)\cos\big(2\tfrac{ws}{|v(t)|}\big) + 4\cos^2\big(2\tfrac{ws}{|v(t)|}\big)\Big) + \Big(\sin^2\big(\tfrac{ws}{|v(t)|}\big) + 4\sin\big(\tfrac{ws}{|v(t)|}\big)\sin\big(2\tfrac{ws}{|v(t)|}\big) + 4\sin^2\big(2\tfrac{ws}{|v(t)|}\big)\Big)}$$

$$= \sqrt{\frac{4R^2w^4}{|v(t)|^4}\Big(\underbrace{\cos^2\big(\tfrac{ws}{|v(t)|}\big) + \sin^2\big(\tfrac{ws}{|v(t)|}\big)}_{1} + 4\big(\underbrace{\sin^2\big(2\tfrac{ws}{|v(t)|}\big) + \cos^2\big(2\tfrac{ws}{|v(t)|}\big)}_{1}\big) - 4\big(\cos(\alpha)\cos(\beta) - \sin\alpha\sin\beta}$$

$$k = \sqrt{\frac{4R^2w^4}{|v(t)|^4}\Big(5 - 4\big(\cos\big(3\tfrac{ws}{|v(t)|}\big)\big)\Big)}$$

$$\vec{e}_N = \frac{\frac{e_\tau(s)}{ds}}{\left|\frac{e_\tau(s)}{ds}\right|} \Rightarrow \frac{\cancel{\frac{2Rw^2}{|v(t)|^2}}\begin{pmatrix}-\cos\big(\frac{ws}{|v(t)|}\big) + 2\cos\big(2\frac{ws}{|v(t)|}\big)\\ -\sin\big(\frac{ws}{|v(t)|}\big) - 2\sin\big(2\frac{ws}{|v(t)|}\big)\end{pmatrix}}{\cancel{\frac{2Rw^2}{|v(t)|^2}}\sqrt{5 - 4\cos\big(3\frac{ws}{|v(t)|}\big)}}$$

$$\rho = \frac{1}{k} \rightarrow \frac{|v(t)|^2}{2Rw^2\sqrt{5 - 4\big(\cos\big(3\frac{ws}{|v(t)|}\big)\big)}}$$

$$a = \underbrace{\frac{d|v(t)|}{dt}e_\tau}_{0} + \frac{|v(t)|^2}{\rho}e_N$$

$$\frac{(\cancel{8R^2w^2(1+\cos(3wt))})\,2Rw^2\sqrt{\cancel{5-4\cos(3\tfrac{ws}{|v(t)|})}}}{(\cancel{8R^2w^2(1+\cos(3wt)})}\cdot\frac{\begin{pmatrix}-\cos\big(\frac{ws}{|v(t)|}\big)+2\cos\ldots\\ -\sin\big(\frac{ws}{|v(t)|}\big)-2\sin(2\ldots\end{pmatrix}}{\sqrt{\cancel{5-4\cos(3\tfrac{ws}{|v(t)|})}}}$$

sieht wie a(t) aus nur statt wt, ist es ein $\frac{ws}{|v(t)|}$! Ist dies dann wirklich gleich?

Ich kann das nicht weiter auflösen!