Intermediate Dynamics
Exercises #6 Answers

1. a) $\underset{\sim}{H}_G = \dfrac{mab\omega}{12(a^2+b^2)}\left(2ab\,\underset{\sim}{i} + (a^2-b^2)\underset{\sim}{j}'\right)$

    b) $K = ma^2b^2\omega^2/12(a^2+b^2)$

2. a) $\underset{\sim}{H}_G = ma^2\omega\left(-\frac{3}{2}\underset{\sim}{i}' + \frac{1}{2}\underset{\sim}{j}' + \frac{10}{3}\underset{\sim}{k}\right)$

    b) $K = \frac{5}{3}ma^2\omega^2$

3. a) $\underset{\sim}{H}_G = \frac{1}{12}m\,\ell^2\left[-\left(\Omega S_\theta C_\theta\right)\underset{\sim}{i}' + \omega\underset{\sim}{j}' + \left(\Omega S_\theta^2\right)\underset{\sim}{k}\right]$

    b) $K = \frac{1}{24}m\,\ell^2\left(\omega^2 + \Omega^2 S_\theta^2\right)$

4. a) $\underset{\sim}{H}_G = \frac{1}{12}m\,\ell^2\left[\dot{\theta}\,\underset{\sim}{i}' + \left(\Omega S_\theta C_\theta\right)\underset{\sim}{j}' + \left(\Omega S_\theta^2\right)\underset{\sim}{k}\right]$

    b) $K = \frac{1}{2}m\left(b\Omega + \frac{1}{2}\ell\,\Omega S_\theta\right)^2 + \frac{1}{6}m\,\ell^2\,\dot{\theta}^2 + \frac{1}{24}m\,\ell^2\,\Omega^2 S_\theta^2$

    $\quad = \frac{1}{2}mb\left(b + \ell S_\theta\right)\Omega^2 + \frac{1}{6}m\,\ell^2\left(\omega^2 + \Omega^2 S_\theta^2\right)$