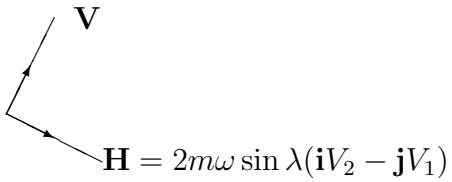
Question
Show that for a body moving horizontally near the surface of the earth in the northern hemisphere the Coriolis Force acts towards the right of the particle's motion. What happens in the southern hemisphere?

Answer
Let $\mathbf{V} = V_1\mathbf{i} + V_2\mathbf{j}$

$$\begin{aligned}
\text{Coriolis Force} &= -2m\omega(-\cos\lambda\mathbf{i} + \sin\lambda\mathbf{k}) \times (V_1\mathbf{i} + V_2\mathbf{j}) \\
&= -2m[\omega\sin\lambda V_1\mathbf{k}\times\mathbf{i} - \omega\cos\lambda V_2\mathbf{i}\times\mathbf{j} + \\
&\qquad \omega\sin\lambda V_2\mathbf{k}\times\mathbf{j}\,] \\
&= 2m\omega[\sin\lambda(\mathbf{i}V_2 - \mathbf{j}V_1) + V_2\cos\lambda\mathbf{k}]
\end{aligned}$$

Horizontal component is $\mathbf{H} = 2m\omega\sin\lambda(\mathbf{i}V_2 - \mathbf{j}V_1)$



Clearly to the right means that $\lambda > 0$ and to the left is when $\lambda < 0$. i.e. we are in the southern hemisphere.