

$$= r_1 r_2 (\sin \theta_1 \sin \phi_1 \cos \theta_2 -$$

$$= r_1 r_2 \left(\frac{1}{r} \left| \begin{array}{ccc} \sin \theta_1 \sin \phi_1 & \cos \theta_1 & \\ \sin \theta_2 \sin \phi_2 & \cos \theta_2 & \end{array} \right| - \left| \begin{array}{ccc} \sin \theta_1 \cos \phi_1 & \cos \theta_1 & \\ \sin \theta_2 \cos \phi_2 & \cos \theta_2 & \end{array} \right| \right.$$

$$\left. , \left| \begin{array}{cc} \sin \theta_1 \cos \phi_1 & \sin \theta_1 \sin \phi_1 \\ \sin \theta_2 \cos \phi_2 & \sin \theta_2 \sin \phi_2 \end{array} \right| \right)$$

$$\frac{|\vec{r}_1 \times \vec{r}_2|}{r_1 r_2} = \left(\left| \begin{array}{ccc} \sin \theta_1 \sin \phi_1 & \cos \theta_1 & \\ \sin \theta_2 \sin \phi_2 & \cos \theta_2 & \end{array} \right|^2 + \left| \begin{array}{ccc} \sin \theta_1 \cos \phi_1 & \cos \theta_1 & \\ \sin \theta_2 \cos \phi_2 & \cos \theta_2 & \end{array} \right|^2 + \left| \begin{array}{cc} \sin \theta_1 \cos \phi_1 & \sin \theta_1 \sin \phi_1 \\ \sin \theta_2 \cos \phi_2 & \sin \theta_2 \sin \phi_2 \end{array} \right|^2 \right)^{1/2}$$

$$= \sin \alpha_{12}$$

$$\vec{V}_1 \times \vec{V}_2 = \vec{V}_1 \times (-\vec{V}_3 - \vec{V}_1) = \vec{V}_3 \times \vec{V}_1 \quad (3)$$

$$\vec{V}_2 \times \vec{V}_3 = \vec{V}_1 \times \vec{V}_2$$

NO. 10.0.0

NO. 10.0.0 (2)

$$V_1 V_2 \sin \theta_{12} = V_2 V_3 \sin \theta_{23} = V_3 V_1 \sin \theta_{13}$$

$$\frac{V_2}{\sin \theta_{13}} = \frac{V_3}{\sin \theta_{12}}$$

$$\frac{V_2}{\sin \theta_{13}} = \frac{V_1}{\sin \theta_{23}}$$

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