

# 1 Equation Array (Left)

$$\begin{aligned} |\vec{a} - \vec{b}|^2 &= (a \cos \alpha - b \cos \beta)^2 - (a \sin \alpha - b \sin \beta)^2 \\ &= (a^2 \cos^2 \alpha - 2ab \cos \alpha \cos \beta + b^2 \cos^2 \beta) + (a^2 \sin \alpha - 2ab \sin \alpha \sin \beta + b^2 \sin^2 \beta) \\ &= a^2 + b^2 - 2ab(\cos \alpha \cos \beta + \sin \alpha \sin \beta) \end{aligned}$$

$$\begin{aligned} \sin(\alpha - \beta) &= \sqrt{1 - \cos^2(\alpha - \beta)} \\ &= \sqrt{1 - (\cos \alpha \cos \beta + \sin \alpha \sin \beta)^2} \\ &= \sqrt{1 - (\cos^2 \alpha \cos^2 \beta + 2 \cos \alpha \cos \beta \sin \alpha \sin \beta + \sin^2 \alpha \sin^2 \beta)} \\ &= \sqrt{1 - \{\cos^2 \alpha(1 - \sin^2 \beta) + 2 \cos \alpha \cos \beta \sin \alpha \sin \beta + \sin^2 \alpha(1 - \cos^2 \beta)\}} \\ &= \sqrt{1 - (\cos^2 \alpha - \cos^2 \alpha \sin^2 \beta + 2 \cos \alpha \cos \beta \sin \alpha \sin \beta + \sin^2 \alpha - \sin^2 \alpha \cos^2 \beta)} \\ &= \sqrt{\cos^2 \alpha \sin^2 \beta - 2 \cos \alpha \cos \beta \sin \alpha \sin \beta + \sin^2 \alpha \cos^2 \beta} \\ &= \sqrt{(\cos \alpha \sin \beta - \sin \alpha \cos \beta)^2} \\ &= \cos \alpha \sin \beta - \sin \alpha \cos \beta \end{aligned}$$

## 2 Equation Array (Center)

$$\begin{aligned}\sum_{j,k} \epsilon_{ijk} \epsilon_{ljk} &= \epsilon_{i12} \epsilon_{l12} + \epsilon_{i13} \epsilon_{l13} + \epsilon_{i21} \epsilon_{l21} + \epsilon_{i23} \epsilon_{l23} + \epsilon_{i31} \epsilon_{l31} + \epsilon_{i32} \epsilon_{l32} \\ &= 0 \cdot 0 + 0 \cdot (-1) + 0 \cdot 0 + 1 \cdot 0 + 0 \cdot 1 + (-1) \cdot 0 = 0 \quad \text{when } i = 1, l = 2 \\ &= 0 \cdot (-1) + 0 \cdot 0 + 0 \cdot (-1) + 1 \cdot 0 + 0 \cdot 0 + (-1) \cdot 0 = 0 \quad \text{when } i = 1, l = 3 \\ &= 0 \cdot 0 + (-1) \cdot 0 + 0 \cdot 0 + 0 \cdot 1 + 1 \cdot 0 + 0 \cdot (-1) = 0 \quad \text{when } i = 2, l = 1 \\ &= 0 \cdot 1 + (-1) \cdot 0 + 0 \cdot (-1) + 0 \cdot 0 + 1 \cdot 0 + 1 \cdot 0 = 0 \quad \text{when } i = 2, l = 3 \\ &= (-1) \cdot 0 + 0 \cdot 0 + (-1) \cdot 0 + 0 \cdot 1 + 0 \cdot 0 + 0 \cdot (-1) = 0 \quad \text{when } i = 3, l = 1 \\ &= (-1) \cdot 0 + 0 \cdot (-1) + (-1) \cdot 0 + 0 \cdot 0 + 0 \cdot 1 + 0 \cdot 0 = 0 \quad \text{when } i = 3, l = 2\end{aligned}$$