



$$f(\vec{q}, m) = \begin{bmatrix} \cos m\theta & -\sin m\theta \\ \sin m\theta & \cos m\theta \end{bmatrix} \vec{q}$$

$$f(\vec{q}, m)^T f(\vec{k}, n) = \vec{q}^T \begin{bmatrix} \cos m\theta & -\sin m\theta \\ \sin m\theta & \cos m\theta \end{bmatrix}^T \begin{bmatrix} \cos n\theta & -\sin n\theta \\ \sin n\theta & \cos n\theta \end{bmatrix} \vec{k}$$

$$= \vec{q}^T \begin{bmatrix} \cos(m-n)\theta & \sin(m-n)\theta \\ -\sin(m-n)\theta & \cos(m-n)\theta \end{bmatrix} \vec{k}$$

$$= g(\vec{q}, \vec{k}, m-n)$$

position

0

$$\theta_0 = \frac{1}{10000^{\frac{0}{768}}} \begin{bmatrix} \cos(0 \times \frac{1}{10000^{\frac{0}{768}}}) \\ \sin(0 \times \frac{1}{10000^{\frac{0}{768}}}) \\ \cos(0 \times \frac{1}{10000^{\frac{2}{768}}}) \\ \sin(0 \times \frac{1}{10000^{\frac{2}{768}}}) \\ \cos(0 \times \frac{1}{10000^{\frac{4}{768}}}) \\ \sin(0 \times \frac{1}{10000^{\frac{4}{768}}}) \\ \vdots \\ \cos(0 \times \frac{1}{10000^{\frac{768}{768}}}) \\ \sin(0 \times \frac{1}{10000^{\frac{768}{768}}}) \end{bmatrix}$$

1

$$\theta_0 = \frac{1}{10000^{\frac{1}{768}}} \begin{bmatrix} \cos(1 \times \frac{1}{10000^{\frac{0}{768}}}) \\ \sin(1 \times \frac{1}{10000^{\frac{0}{768}}}) \\ \cos(1 \times \frac{1}{10000^{\frac{2}{768}}}) \\ \sin(1 \times \frac{1}{10000^{\frac{2}{768}}}) \\ \cos(1 \times \frac{1}{10000^{\frac{4}{768}}}) \\ \sin(1 \times \frac{1}{10000^{\frac{4}{768}}}) \\ \vdots \\ \cos(1 \times \frac{1}{10000^{\frac{768}{768}}}) \\ \sin(1 \times \frac{1}{10000^{\frac{768}{768}}}) \end{bmatrix}$$

...

511

$$\theta_0 = \frac{1}{10000^{\frac{511}{768}}} \begin{bmatrix} \cos(511 \times \frac{1}{10000^{\frac{0}{768}}}) \\ \sin(511 \times \frac{1}{10000^{\frac{0}{768}}}) \\ \cos(511 \times \frac{1}{10000^{\frac{2}{768}}}) \\ \sin(511 \times \frac{1}{10000^{\frac{2}{768}}}) \\ \cos(511 \times \frac{1}{10000^{\frac{4}{768}}}) \\ \sin(511 \times \frac{1}{10000^{\frac{4}{768}}}) \\ \vdots \\ \cos(511 \times \frac{1}{10000^{\frac{768}{768}}}) \\ \sin(511 \times \frac{1}{10000^{\frac{768}{768}}}) \end{bmatrix}$$