q_x and q_z derivation

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August 2, 2016

Abstract

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1 Introduction

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2 For symmetric reflection

2.1 q_x

$$q_x = cos(\theta_B + \Delta\varepsilon - \Delta\omega) - cos(\theta_B + \Delta\omega) \tag{1}$$

$$\begin{aligned}
q_x = cos(\theta_B) \cdot cos(\Delta\varepsilon - \Delta\omega) - sin(\theta_B) \cdot sin(\Delta\varepsilon - \Delta\omega) - cos(\theta_B) \cdot \cancelto{1}{cos(\Delta\omega)} + sin(\theta_B) \cdot \cancelto{\Delta\omega}{sin(\Delta\omega)} = \\
= cos(\theta_B) \cdot [\cancelto{1}{cos(\Delta\omega)} \cdot \cancelto{1}{cos(\Delta\varepsilon)} + \cancelto{\Delta\omega}{sin(\Delta\omega)} \cdot \cancelto{\Delta\varepsilon}{sin(\Delta\varepsilon)}] - \\
- sin(\theta_B) \cdot [\cancelto{\Delta\varepsilon}{sin(\Delta\varepsilon)} \cdot \cancelto{1}{cos(\Delta\omega)} - \cancelto{1}{cos(\Delta\varepsilon)} \cdot \cancelto{\Delta\omega}{sin(\Delta\omega)}] - \\
- cos(\theta_B) + \Delta\omega \cdot sin(\theta_B) = \\
= cos(\theta_B) + \cancelto{0}{\Delta\omega \cdot \Delta\varepsilon \cdot cos(\theta_B)} - \Delta\varepsilon \cdot sin(\theta_B) + \Delta\omega \cdot sin(\theta_B) - cos(\theta_B) + \Delta\omega \cdot sin(\theta_B)
\end{aligned}$$

$$q_x = (2\Delta\omega - \Delta\varepsilon) \cdot sin(\theta_B). \tag{2}$$

2.2 q_z

$$q_z = sin(\theta_B + \Delta\varepsilon - \Delta\omega) + sin(\theta_B + \Delta\omega) - 2sin(\theta_B) \tag{3}$$

$$q_z = sin(\theta_B) \cdot cos(\Delta\varepsilon - \Delta\omega) + cos(\theta_B) \cdot sin(\Delta\varepsilon - \Delta\omega) + sin(\theta_B) \cdot \cancelto{1}{cos(\Delta\omega)} +$$

$$+cos(\theta_B) \cdot \cancelto{\Delta\omega}{sin(\Delta\omega)} - 2sin(\theta_B) =$$

$$= sin(\theta_B) \cdot [\cancelto{1}{cos(\Delta\omega)} \cdot \cancelto{1}{cos(\Delta\varepsilon)} + \cancelto{\Delta\omega}{sin(\Delta\omega)} \cdot \cancelto{\Delta\varepsilon}{sin(\Delta\varepsilon)}]+$$

$$+cos(\theta_B) \cdot [\cancelto{\Delta\varepsilon}{sin(\Delta\varepsilon)} \cdot \cancelto{1}{cos(\Delta\omega)} - \cancelto{1}{cos(\Delta\varepsilon)} \cdot \cancelto{\Delta\omega}{sin(\Delta\omega)}]+$$

$$+sin(\theta_B) + \Delta\omega \cdot cos(\theta_B) - 2sin(\theta_B) =$$

$$= sin(\theta_B) + \cancelto{0}{\Delta\omega \cdot \Delta\varepsilon \cdot sin(\theta_B)} + \Delta\varepsilon \cdot cos(\theta_B) - \Delta\omega \cdot cos(\theta_B)+$$

$$+sin(\theta_B) + \Delta\omega \cdot cos(\theta_B) - 2sin(\theta_B)$$

$$q_z = \Delta\varepsilon \cdot cos(\theta_B) \tag{4}$$