10. Reciprocal Space

Problems

10.1. Consider diffraction from planes with $g = 7.0\ \text{nm}^{-1}$, where the vector $\mathbf{g} = g\hat{\mathbf{x}}$, using electrons with energy $200.$ KeV. Assume the beam is tilted by $\phi = 32.0$ mrad from vertical (i.e., $\mathbf{k} \cdot \hat{\mathbf{x}} = -k \cdot \sin\phi$, where $\mathbf{k}$ is the incident wavevector.)

a) Find the excitation error s_g.

b) Is the reciprocal-lattice point g inside the Ewald sphere, or outside the Ewald sphere?

10.2. For electrons with energy $200.$ KeV, find:

a) The radius of the Ewald sphere; b) The volume of the Ewald sphere.

Assume the beam is tilted by $\phi = 12.0$ mrad from the normal to the ZOLZ of a crystal. Find:

c) The diameter of the circular intersection of the Ewald sphere with the ZOLZ.