

3.34 We are asked to convert $[110]$ and $[00\bar{1}]$ directions into the four-index Miller-Bravais scheme for hexagonal unit cells. For $[110]$

$$u' = 1,$$

$$v' = 1,$$

$$w' = 0$$

From Equations 3.6

$$u = \frac{1}{3}(2u\tilde{O} - v\tilde{O}) = \frac{1}{3}[(2)(1) - 1] = \frac{1}{3}$$

$$v = \frac{1}{3}(2v\tilde{O} - u\tilde{O}) = \frac{1}{3}[(2)(1) - 1] = \frac{1}{3}$$

$$t = -(u + v) = -\left(\frac{1}{3} + \frac{1}{3}\right) = -\frac{2}{3}$$

$$w = w' = 0$$

It is necessary to multiply these numbers by 3 in order to reduce them to the lowest set of integers. Thus, the direction is represented as $[uvw] = [11\bar{2}0]$.

For $[00\bar{1}]$, $u' = 0$, $v' = 0$, and $w' = -1$; therefore,

$$u = \frac{1}{3}[(2)(0) - 0] = 0$$

$$v = \frac{1}{3}[(2)(0) - 0] = 0$$

$$t = -(0 + 0) = 0$$

$$w = -1$$

Thus, the direction is represented as $[uvw] = [000\bar{1}]$.