$$x = u\cos(v)e_x + u\sin(v)e_y + (u\cos(v) + w)e_z$$

$$x_u = \cos(v)e_x + \sin(v)e_y + \cos(v)e_z$$

$$x_v = -u\sin(v)e_x + u\cos(v)e_y - u\sin(v)e_z$$

$$x_w = e_z$$

$$x^u = \cos(v)e_x + \sin(v)e_y$$

$$x^v = -\frac{\sin(v)}{u}e_x + \frac{\cos(v)}{u}e_y$$

 $oldsymbol{x}^w = -oldsymbol{e_x} + oldsymbol{e_z}$