$$(u, v) \to (r, \theta, \phi) = \begin{bmatrix} 1, & u, & v \end{bmatrix}$$

$$g = \begin{bmatrix} 1 & 0 \\ 0 & \sin^2(u) \end{bmatrix}$$

$$\nabla f = \partial_u f \boldsymbol{e_u} + \frac{\partial_v f}{\sin^2(u)} \boldsymbol{e_v}$$

$$F = F^u \boldsymbol{e_u} + F^v \boldsymbol{e_v}$$

$$\nabla F = \left(\frac{F^u}{\tan(u)} + \partial_u F^u + \partial_v F^v \right) + \left(\frac{2F^v}{\tan(u)} + \partial_u F^v - \frac{\partial_v F^u}{\sin^2(u)} \right) \boldsymbol{e_u} \wedge \boldsymbol{e_v}$$

$$g = \begin{bmatrix} -\frac{\sqrt{2}}{4} + \frac{1}{2} \end{bmatrix}$$

$$(s) \to (u, v) = \begin{bmatrix} \frac{\pi}{8}, & s \end{bmatrix}$$

$$H = H^s \boldsymbol{e_s}$$

$$H^s \boldsymbol{e_s}$$

$$\nabla h = \left(2\sqrt{2} + 4 \right) \partial_s h \boldsymbol{e_s}$$

$$\nabla H = \partial_s H^s$$