

$$(u,v)\rightarrow (r,\theta,\phi)=[1,\quad u,\quad v]$$

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

$$\nabla f = \partial_u f \boldsymbol{e}_{\boldsymbol{u}} + \frac{\partial_v f}{\sin^2(u)} \boldsymbol{e}_{\boldsymbol{v}}$$

$$F=F^ue_{\boldsymbol{u}}+F^ve_{\boldsymbol{v}}$$

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

$$g=\left[-\frac{\sqrt{2}}{4}+\frac{1}{2}\right]$$

$$(s)\rightarrow (u,v)=[\frac{\pi}{8},\quad s]$$

$$H=H^s\boldsymbol{e}_{\boldsymbol{s}}$$

$$H^s\boldsymbol{e}_{\boldsymbol{s}}$$

$$\nabla h = \left(2\sqrt{2}+4\right)\partial_sh\boldsymbol{e}_{\boldsymbol{s}}$$

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