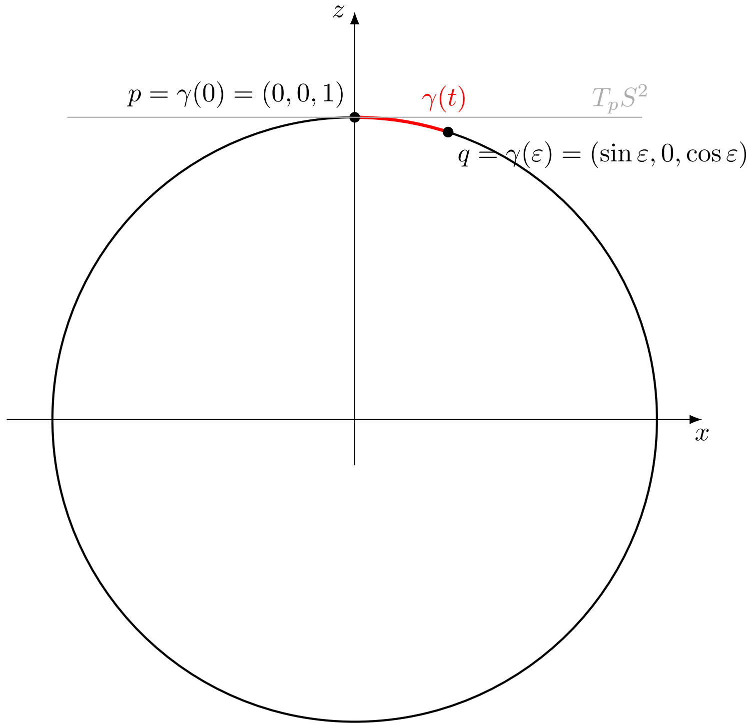

$\gamma(t) = (\sin t, 0, \cos t)$
$\gamma'(t) = (\cos t, 0, -\sin t) \Rightarrow \gamma'(0) = (1,0,0) = v$

Outward normal on S^2: $N(x) = x$.
So $N(\gamma(t)) = \gamma(t)$. Hence

$$\frac{N(\gamma(\varepsilon)) - N(\gamma(0))}{\varepsilon} = \frac{\gamma(\varepsilon) - p}{\varepsilon} = \left(\frac{\sin\varepsilon}{\varepsilon},\ 0,\ \frac{\cos\varepsilon - 1}{\varepsilon}\right)$$

$$\xrightarrow[\varepsilon\to 0]{} (1,0,0) = v \Rightarrow (dN)_p(v) = v.$$

$$S_p(v) = -(dN)_p(v) = -v \Rightarrow S_p = -\mathrm{Id}_{T_pS^2}.$$