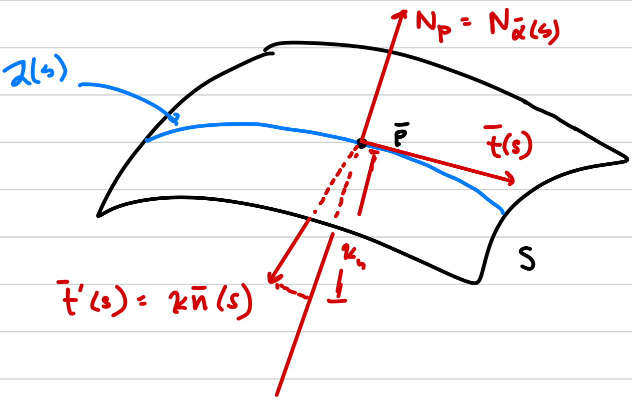
Recall: given a regular curve $\bar{\alpha}(t)$, can reparametrize with respect to arc length, $\bar{\alpha}(s)$.



we considered normal curvature κ_n of $\bar{\alpha}$ at $\bar{p}$:

signed length of projection of $\bar{t}'(s) = \kappa \bar{n}(s)$ onto $N_{\bar{\alpha}(s)}$.

$$\kappa_n = \bar{t}'(s) \cdot N_{\bar{\alpha}(s)}$$

$\kappa \bar{n}(s)$

OTOH, we can consider tangential component of $t'(s) = \kappa n(s)$.

Called the geodesic curvature denoted κ_g.

covariant derivative

To do this, introduce $\dfrac{D\bar{\alpha}'(t)}{dt}$:

acceleration of $\bar{\alpha}(t)$

For any regular curve $\bar{\alpha}(t)$, $\dfrac{d}{dt}\bar{\alpha}'(t) = \bar{\alpha}''(t)$.

capital D

Now, let $\dfrac{D\bar{\alpha}'(t)}{dt}$ = projection of $\bar{\alpha}''(t)$ onto $T_{\bar{\alpha}(t)}S$.

acceleration of $\bar{\alpha}(t)$ from point of view of the surface.