Words we remember

$FFF = (g_{ij})$ ✓

geodesic ✓

dF ✓

Gauss map ✓

κ_n, κ_g ✓

Covariant derivative ✓

Γ^k_{ij} ✓

tangent plane ✓

L_{ij} ✓, L^i_j ✓

SFF

Weingarten

coordinate transform. ✓

Darboux frame ✓

directional deriv. ✓

parallel transp. ✓ (Foucault pend.)

Clairaut's relation ✓

acceleration vs. κ_g ✓

surfaces of revolution ✓

Curves

Curves on surfaces

Surfaces

Background

- Jacobian matrix
- multivariable chain rule
- product rules

First definitions

- simple surfaces
- tangent plane
- normal vector
- coordinate trans.
- FFF (g_{ij})

Surface curves

- $\vec{\alpha} = \vec{x} \circ \vec{\alpha}_u$
- $\kappa_g = \langle \frac{d}{ds}\vec{T}, \vec{S} \rangle$
- $\kappa_n = \langle \frac{d}{ds}\vec{T}, \vec{n} \rangle$
- Darboux frame
- Foucault pend. $\rightsquigarrow$ parallel transp.
- geodesics
- Clairaut's relation
- unit speed $\vec{\alpha}$ is geod. iff $\vec{\alpha}'' \perp \vec{x}$

Surfaces

- directional deriv.

  $\vdots$ Covariant deriv.
- Γ_{ij}^k (how does $\vec{x}$ bend?)
- Gauss map
- Weingarten L_j^i
- SFF L_{ij}

Running example: surfaces of revolution