$$\alpha = \frac{\nabla Z}{\|Z\|} -$$

$$\nabla R \!\!\!\!\!\!= \nabla R = \frac{\nabla Z}{\|Z\|} - \frac{1}{2} \frac{\nabla(Z^T Z) Z}{(Z^T Z)^{3/2}} .$$

$$= \frac{\nabla Z}{\|Z\|} - \frac{Z Z^T \nabla Z}{Z^T Z \|Z\|} \qquad \text{since} \quad \nabla(Z^T Z) = 2 Z^T \nabla$$

$$= \left(I_n - \frac{Z Z^T}{Z^T Z} \right) \left(\frac{\nabla Z}{\|Z\|} \right) .$$

$$\nabla Z \sim N(0, \Lambda) \; ?$$

$$Z_i = Y_i - \hat{\mu} \implies \nabla Z_i = \nabla Y_i - \nabla \hat{\mu}$$

$$\implies \text{cov}(\nabla Z_i$$

$$Y_i - \hat{\mu} = Y_i - \frac{1}{n} \sum Y_i = \left(Y_i - \frac{1}{n} Y_i \right) \frac{1}{n} \sum_{j \neq i} Y_j$$

$$= \frac{n-1}{n} (\nabla Y_i) - \frac{1}{n} \sum_{j \neq i} \nabla Y_j$$