

1 PVO

$$\text{field}\#4(3) \parallel F = (\frac{V}{|V|}) \bullet (\frac{U}{|U|})$$

$$\text{Probe } \frac{(A \bullet C)}{\langle ||A|| * ||C|| \rangle}$$

Gradient .

$$\rightarrow_{\text{none}} ((\frac{1}{|C|} * \frac{1}{|A|} * (C \bullet \nabla \otimes A)) + (A \bullet (((((C * \frac{(-1 * (A \bullet \nabla \otimes A))}{(|C| * |A| * (A \bullet A))}))^T + (\frac{1}{|A|} * (((\frac{1}{|C|} * \nabla \otimes C))^T + (((C * \frac{(-1 * (C \bullet \nabla \otimes C))}{((C \bullet C) * |C|)}))^T))))^T)))$$

$$\rightarrow_{\text{rewrite}} (\frac{(C \bullet \nabla \otimes A)}{(|C| * |A|)} + \frac{(-1 * (C \bullet A) * (A \bullet \nabla \otimes A))}{(|C| * |A| * (A \bullet A))} + \frac{((\nabla \otimes C)^T \bullet A)}{(|A| * |C|)} + \frac{(-1 * (C \bullet A) * (C \bullet \nabla \otimes C))}{(|A| * |C| * (C \bullet C))})$$

Hessian .

$$\begin{aligned} &\rightarrow_{\text{none}} (((\frac{1}{|C|} * (\frac{(-1 * (A \bullet \nabla \otimes A))}{((A \bullet A) * |A|)} * (C \bullet \nabla \otimes A))))^T + (\frac{1}{|A|} * ((\frac{1}{|C|} * ((\nabla \otimes A)^T \bullet \nabla \otimes C)) + \\ &(C \bullet \text{Trav}((\text{Trav}(((\nabla \otimes A * \frac{(-1 * (C \bullet \nabla \otimes C))}{((C \bullet C) * |C|)}))) < 1, 2, 0 > + \text{Trav}((\frac{1}{|C|} * \nabla \otimes \nabla \otimes \\ &A)) < 1, 2, 0 >))) + (((((C * \frac{(-1 * (A \bullet \nabla \otimes A))}{(|C| * |A| * (A \bullet A))}))^T + (\frac{1}{|A|} * (((\frac{1}{|C|} * \nabla \otimes \\ &C))^T + (((C * \frac{(-1 * (C \bullet \nabla \otimes C))}{((C \bullet C) * |C|)}))^T))) \bullet \nabla \otimes A) + (A \bullet \text{Trav}((\text{Trav}(((\frac{(-1 * (A \bullet \nabla \otimes A))}{(|C| * |A| * (A \bullet A))} * \\ &\nabla \otimes C))) < :, 2, 1 > + \text{Trav}(((C * \frac{((-1 * |C| * |A| * (A \bullet A) * (((\nabla \otimes A)^T \bullet \nabla \otimes A) + (A \bullet \nabla \otimes \nabla \otimes A)) - (-1 * ((A \bullet \nabla \otimes A) \otimes (((A \bullet A) * |C| * \frac{(A \bullet \nabla \otimes A))}{|A|} \\ &1, 2, 0 > + \text{Trav}((((((\frac{1}{|C|} * \nabla \otimes C))^T + (((C * \frac{(-1 * (C \bullet \nabla \otimes C))}{((C \bullet C) * |C|)}))^T * \frac{(-1 * (A \bullet \nabla \otimes A))}{((A \bullet A) * |A|)})))) < : \\ &, 2, 1 > + (\frac{1}{|A|} * (\text{Trav}(((\nabla \otimes C * \frac{(-1 * (C \bullet \nabla \otimes C))}{((C \bullet C) * |C|)}))) < 1, 2, 0 > + \text{Trav}((\frac{1}{|C|} * \nabla \otimes \\ &\nabla \otimes C)) < 1, 2, 0 > + \text{Trav}(((\frac{(-1 * (C \bullet \nabla \otimes C))}{((C \bullet C) * |C|)} * \nabla \otimes C))) < :, 2, 1 > + \text{Trav}(((C * \\ &\frac{((-1 * (C \bullet C) * |C| * (((\nabla \otimes C)^T \bullet \nabla \otimes C) + (C \bullet \nabla \otimes \nabla \otimes C)) - (-1 * ((C \bullet \nabla \otimes C) \otimes (((C \bullet C) * \frac{(C \bullet \nabla \otimes C))}{|C|} + (|C| * 2 * (C \bullet \nabla \otimes C)))))) < \\ &\frac{((C \bullet C) * |C| * (C \bullet C) * |C|)}{1, 2, 0 >)))) < 1, 2, 0 >)) \\ &\rightarrow_{\text{rewrite}} (\frac{-(((C \bullet \nabla \otimes A) \otimes (A \bullet \nabla \otimes A)))}{(|C| * |A| * (A \bullet A))} + \frac{((\nabla \otimes A)^T \bullet \nabla \otimes C)}{(|C| * |A|)} + \frac{-(((\nabla \otimes A)^T \bullet C) \otimes (C \bullet \nabla \otimes C))}{(|A| * |C| * (C \bullet C))} + \\ &\frac{(\text{Trav}(\nabla \otimes \nabla \otimes A) < 2, 0, 1 > \bullet C)}{(|C| * |A|)} + (\frac{-(((C \bullet \nabla \otimes A) * (A \bullet \nabla \otimes A)))}{(|A| * |C| * (A \bullet A))})^T + \frac{((\nabla \otimes C)^T \bullet \nabla \otimes A)}{(|C| * |A|)} + (\frac{-(((C \bullet \nabla \otimes A) * (C \bullet \nabla \otimes C))}{(|C| * |A| * (C \bullet C))})^T + \\ &(\frac{-(((\nabla \otimes C)^T \bullet A) * (A \bullet \nabla \otimes A))}{(|A| * |C| * (A \bullet A))})^T + \frac{-((C \bullet A) * ((\nabla \otimes A)^T \bullet \nabla \otimes A))}{(|A| * |C| * (A \bullet A))} + \frac{-((C \bullet A) * (A \bullet \nabla \otimes \nabla \otimes A))}{(|A| * |C| * (A \bullet A))} + \\ &\frac{((C \bullet A) * ((A \bullet \nabla \otimes A) \otimes (A \bullet \nabla \otimes A)))}{(|A| * |C| * ((A \bullet A))^2)} + \frac{((C \bullet A) * ((A \bullet \nabla \otimes A) \otimes (C \bullet \nabla \otimes C)))}{(|A| * |C| * (C \bullet C) * (A \bullet A))} + \frac{(2 * (C \bullet A) * ((A \bullet \nabla \otimes A) \otimes (A \bullet \nabla \otimes A)))}{(|C| * |A| * (A \bullet A))^2} + \\ &\frac{-(((\nabla \otimes C)^T \bullet A) \otimes (A \bullet \nabla \otimes A))}{(|C| * |A| * (A \bullet A))} + (\frac{((C \bullet A) * ((A \bullet \nabla \otimes A) * (C \bullet \nabla \otimes C)))}{(|C| * |A| * (C \bullet C) * (A \bullet A))})^T + \frac{-(((\nabla \otimes C)^T \bullet A) \otimes (C \bullet \nabla \otimes C))}{(|C| * |A| * (C \bullet C))} + \\ &\frac{(\text{Trav}(\nabla \otimes \nabla \otimes C) < 2, 0, 1 > \bullet A)}{(|C| * |A|)} + (\frac{-(((\nabla \otimes C)^T \bullet A) * (C \bullet \nabla \otimes C))}{(|C| * |A| * (C \bullet C))})^T + \frac{-(|C| * (C \bullet A) * ((\nabla \otimes C)^T \bullet \nabla \otimes C))}{(|A| * (C \bullet C) * (C \bullet C))} + \\ &\frac{-(|C| * (C \bullet A) * (C \bullet \nabla \otimes \nabla \otimes C))}{(|A| * (C \bullet C) * (C \bullet C))} + \frac{((C \bullet A) * ((C \bullet \nabla \otimes C) \otimes (C \bullet \nabla \otimes C)))}{(|C| * |A| * ((C \bullet C))^2)} + \frac{(2 * |C| * (C \bullet A) * ((C \bullet \nabla \otimes C) \otimes (C \bullet \nabla \otimes C)))}{(|A| * (C \bullet C) * ((C \bullet C))^2)} \end{aligned}$$

2 Moe

field#k(3)[3] G= ∇V
field#k(3)[] F= $(-\nabla|G|) \bullet (\frac{G}{|G|})$

Probe $\rightarrow_{none} ((-\frac{(\nabla A \bullet \nabla \otimes \nabla A)}{|\nabla A|} \bullet \nabla A) * \frac{1}{|\nabla A|})$

$\rightarrow_{rewrite} \frac{(-1 * (\nabla A \bullet (\nabla A \bullet \nabla \otimes \nabla A)))}{((|\nabla A|)^2)}$

Gradient .

$\rightarrow_{none} ((\frac{1}{|\nabla A|} * ((\nabla A \bullet (-\frac{((|\nabla A| * (((\nabla \otimes \nabla A)^T \bullet \nabla \otimes \nabla A))^T + ((\nabla A \bullet \nabla \otimes \nabla \otimes \nabla A))^T)) - ((\frac{(\nabla A \bullet \nabla \otimes \nabla A)}{|\nabla A|} * (\nabla A \bullet \nabla \otimes \nabla A)))))) ^T) +$
 $(-\frac{(\nabla A \bullet \nabla \otimes \nabla A)}{|\nabla A|} \bullet \nabla \otimes \nabla A))) + ((-\frac{(\nabla A \bullet \nabla \otimes \nabla A)}{|\nabla A|} \bullet \nabla A) * \frac{(\nabla A \bullet \nabla A)}{(|\nabla A| * (\nabla A \bullet \nabla A))}))$
 $\rightarrow_{rewrite} (-\frac{((\nabla A \bullet ((\nabla \otimes \nabla A)^T \bullet \nabla \otimes \nabla A)))}{(\nabla A \bullet \nabla A)} + \frac{-((\nabla A \bullet (\nabla A \bullet \nabla \otimes \nabla \otimes \nabla A)))}{(\nabla A \bullet \nabla A)} + \frac{(2 * (\nabla A \bullet (\nabla A \bullet \nabla \otimes \nabla A)) * (\nabla A \bullet \nabla \otimes \nabla A))}{((\nabla A \bullet \nabla A))^2} +$
 $\frac{-(((\nabla \otimes \nabla A)^T \bullet (\nabla A \bullet \nabla \otimes \nabla A)))}{(\nabla A \bullet \nabla A)})$

Hessian .