The shear eastimator: G_1, G_2, N, U, V.

Spin-0	Spin-2	Spin-4
	$G_1' + iG_2' = (G_1 + iG_2)\exp(2i\theta)$	$U' + iV' = (U + iV)\exp(4i\theta)$
$N \to N$	$G_1' = G_1\cos(2\theta) - G_2\sin(2\theta)$	$U' = U\cos(4\theta) - V\sin(4\theta)$
	$G_2' = G_1\sin(2\theta) + G_2\cos(2\theta)$	$V' = U\sin(4\theta) + V\cos(4\theta)$

Two points: (α_1, β_1), (α_2, β_2).

$$\Gamma := (\alpha_2 - \alpha_1)/(\beta_2 - \beta_1)$$

$$\cos(\theta) = \frac{\alpha_2 - \alpha_1}{\sqrt{(\alpha_2 - \alpha_1)^2 + (\beta_2 - \beta_1)^2}} \qquad \sin(\theta) = \frac{\beta_2 - \beta_1}{\sqrt{(\alpha_2 - \alpha_1)^2 + (\beta_2 - \beta_1)^2}}$$

$$= \frac{(\alpha_2 - \alpha_1)/(\beta_2 - \beta_1)}{\sqrt{[(\alpha_2 - \alpha_1)/(\beta_2 - \beta_1)]^2 + 1}} \qquad = \frac{1}{\sqrt{[(\alpha_2 - \alpha_1)/(\beta_2 - \beta_1)]^2 + 1}}$$

$$= \frac{\Gamma}{\sqrt{\Gamma^2 + 1}} \qquad = \frac{1}{\sqrt{\Gamma^2 + 1}}$$

$$\cos(2\theta) = \cos^2(\theta) - \sin^2(\theta) \qquad \sin(2\theta) = 2\cos(\theta)\sin(\theta)$$

$$= \frac{(\alpha_2 - \alpha_1)^2 - (\beta_2 - \beta_1)^2}{(\alpha_2 - \alpha_1)^2 + (\beta_2 - \beta_1)^2} \qquad = \frac{2(\alpha_2 - \alpha_1)(\beta_2 - \beta_1)}{(\alpha_2 - \alpha_1)^2 + (\beta_2 - \beta_1)^2}$$

$$= \frac{\Gamma^2 - 1}{\Gamma^2 + 1} \qquad = \frac{2\Gamma}{\Gamma^2 + 1}$$

$$\begin{aligned} \cos(4\theta) &= \cos^2(2\theta) - \sin^2(2\theta) \\ &= \frac{[(\alpha_2 - \alpha_1)^2 - (\beta_2 - \beta_1)^2]^2 - 4(\alpha_2 - \alpha_1)^2(\beta_2 - \beta_1)^2}{[(\alpha_2 - \alpha_1)^2 + (\beta_2 - \beta_1)^2]^2} \\ &= \frac{(\Gamma^2 - 1)^2 - 4\Gamma^2}{(\Gamma^2 + 1)^2} \end{aligned}$$

$$\begin{aligned} \sin(4\theta) &= 2\cos(2\theta)\sin(2\theta) \\ &= \frac{4[(\alpha_2 - \alpha_1)^2 - (\beta_2 - \beta_1)^2](\alpha_2 - \alpha_1)(\beta_2 - \beta_1)}{[(\alpha_2 - \alpha_1)^2 + (\beta_2 - \beta_1)^2]^2} \\ &= \frac{4\Gamma(\Gamma^2 - 1)}{(\Gamma^2 + 1)^2} \end{aligned}$$

Data structure for correlation function calculation

The data is organized by Python in hdf5 format

(n,m) np : n x m numpy array

Inp: INT numpy array   Dnp: DOUBLE numpy array