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

Spin-0:

$$N \to N$$

Spin-2:

$$\begin{aligned} G_1' + iG_2' &= (G_1 + iG_2)\exp(2i\theta) \\ G_1' &= G_1\cos(2\theta) - G_2\sin(2\theta) \\ G_2' &= G_1\sin(2\theta) + G_2\cos(2\theta) \end{aligned}$$

Spin-4:

$$\begin{aligned} U' + iV' &= (U + iV)\exp(4i\theta) \\ U' &= U\cos(4\theta) - V\sin(4\theta) \\ V' &= U\sin(4\theta) + V\cos(4\theta) \end{aligned}$$

Two points: (α_1, β_1), (α_2, β_2).

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

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

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

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

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

Data structure for correlation function calculation

The data is organized by Python in hdf5 format