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

Spin-0 Spin-2

Spin-4

$$G_1'+iG_2'=(G_1+iG_2)\exp(2i heta) \qquad U'+iV'=(U+iV)\exp(4i heta) 
onumber \ N o N \qquad G_1'=G_1\cos(2 heta)-G_2\sin(2 heta) \qquad U'=U\cos(4 heta)-V\sin(4 heta) 
onumber \ G_2'=G_1\sin(2 heta)+G_2\cos(2 heta) \qquad V'=U\sin(4 heta)+V\cos(4 heta)$$

Two points:  $(\alpha_1, \beta_1)$ ,  $(\alpha_2, \beta_2)$ .

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

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

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

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

$$egin{align} \cos(2 heta) &= \cos^2( heta) - \sin^2( heta) & \sin(2 heta) &= 2\cos( heta)\sin( heta) \ &= rac{(lpha_2 - lpha_1)^2 - (eta_2 - eta_1)^2}{(lpha_2 - lpha_1)^2 + (eta_2 - eta_1)^2} &= rac{2(lpha_2 - lpha_1)(eta_2 - eta_1)}{(lpha_2 - lpha_1)^2 + (eta_2 - eta_1)^2} \ &= rac{\Gamma^2 - 1}{\Gamma^2 + 1} &= rac{2\Gamma}{\Gamma^2 + 1} \end{split}$$

$$egin{aligned} \cos(4 heta) &= \cos^2(2 heta) - \sin^2(2 heta) \ &= rac{[(lpha_2 - lpha_1)^2 - (eta_2 - eta_1)^2]^2 - 4(lpha_2 - lpha_1)^2 (eta_2 - eta_1)^2}{[(lpha_2 - lpha_1)^2 + (eta_2 - eta_1)^2]^2} \ &= rac{(\Gamma^2 - 1)^2 - 4\Gamma^2}{(\Gamma^2 + 1)^2} \ \sin(4 heta) &= 2\cos(2 heta)\sin(2 heta) \ &= rac{4[(lpha_2 - lpha_1)^2 - (eta_2 - eta_1)^2](lpha_2 - lpha_1)(eta_2 - eta_1)}{[(lpha_2 - lpha_1)^2 + (eta_2 - eta_1)^2]^2} \ &= rac{4\Gamma(\Gamma^2 - 1)}{(\Gamma^2 + 1)^2} \end{aligned}$$

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## 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

