$$\bar{\delta} = \frac{\langle W(r)\,\delta(r)\rangle}{\langle W(r)\rangle} \quad ; \quad n = \bar{n}\,(1+\delta)$$

deseamos calcular el sezgo de los estimadores de Hamilton

$$\xi_H^{(2)}(r) = \frac{DD(r)\;RR(r)}{DR(r)^2}$$

$$\Rightarrow R_1 R_2(r) = \bar{n}^2 \langle\langle W_1 W_2 \rangle\rangle = \bar{n}^2 \iint W_1 W_2\, dV_1\, dV_2$$

$$\Rightarrow D_1 D_2(r) = (1 + \psi_1 + \psi_2 + \xi)\, R_1 R_2$$

con $\psi_i(x) = \psi(x_i) = \dfrac{\langle\langle W(r)\,W(r)\,\delta_i\rangle\rangle}{\langle\langle W(r)\,W(r)\rangle\rangle}$; $i = 1, 2$

$$\xi_{12} = \frac{\langle\langle W(r)\,W(r)\,\delta_1\delta_2\rangle\rangle}{\langle\langle W(r)\,W(r)\rangle\rangle}$$

$$\Rightarrow DD(r)\,RR(r) = (1+\psi_1+\psi_2+\xi)\,R_1R_2^{\,2}$$

Ahora

$$DR(r) = \int n_1 W_1 dV_1 \int \bar{n}_2 W_2\, dV_2 = \int \bar{n}_1(1+\delta_1) W_1 dV_1 \int \bar{n}_2 W_2 dV_2$$

$$= \bar{n}^2 \iint (1+\delta_1)\, W_1\, W_2\, dV_1\, dV_2 = \bar{n}^2\left(\langle\langle W_1 W_2\rangle\rangle + \langle\langle W_1 W_2 \delta_1\rangle\rangle\right)$$

$$\Rightarrow DR(r)^2 = \bar{n}^4\left(\langle\langle W_1 W_2\rangle\rangle + \langle\langle W_1 W_2\delta_1\rangle\rangle\right)^2 = \bar{n}^4\,(1+\psi_1)^2 \langle\langle W_1 W_2\rangle\rangle^2$$

$$\Rightarrow \xi_H^{(2)}(r) = \frac{(1+\psi_1+\psi_2+\xi)\,\bar{n}^4 \langle\langle W_1 W_2\rangle\rangle^2}{\bar{n}^4\,(1+\psi_1)^2 \langle\langle W_1 W_2\rangle\rangle^2}$$

$$\Rightarrow \boxed{\xi_H^{(2)}(r) = \frac{1+\psi_1+\psi_2+\xi_{12}}{(1+\psi_1)^2}}$$

Ahora para el sezgo de Landy - Szalay

$$\xi^{(2)}_{LZ} = 1 + \frac{1}{N_{est}^2}\,\frac{DD(r)}{RR(r)} - 2\,\frac{1}{N_{est}}\,\frac{DR(r)}{RR(r)}$$

como $$\frac{1}{N_{est}} = \frac{1}{n_{est}} = \frac{1}{(1+\bar{\delta})^2}$$

$$R_1 R_2(r) = \bar{n}^2 \langle\langle W_1 W_2 \rangle\rangle$$

$$D_1 D_2(r) = (1 + \psi_1 + \psi_2 + \xi_{12})\, R_1 R_2$$

$$D_1 R_2(r) = \bar{n}^2 (1 + \psi_1) \langle\langle W_1 W_2 \rangle\rangle$$

$$\Rightarrow \xi^{(2)}_{LZ} = 1 + \frac{1}{(1+\bar{\delta})^2}(1 + \psi_1 + \psi_2 + \xi_{12}) - \frac{2}{(1+\bar{\delta})^*}\,\frac{\bar{n}^2 (1+\psi_1)\langle\langle W_1 W_2\rangle\rangle}{\bar{n}^2 \langle\langle W_1 W_2\rangle\rangle}$$

$$\Rightarrow \xi^{(2)}_{LZ} = 1 + \frac{1}{(1+\bar{\delta})^2}(1 + \psi_1 + \psi_2 + \xi_{12}) - \frac{2}{(1+\bar{\delta})}(1 + \psi_1)$$

$$\Rightarrow \xi^{(2)}_{LZ} = 1 + \xi^{(2)}_{H}\,\frac{(1+\psi_1)^2}{(1+\bar{\delta})^2} - 2\,\frac{(1+\psi_1)}{(1+\bar{\delta})}$$