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

Para estimar el sezgo para la FC de Hamilton

$$\xi_H^{(2)} = \frac{DD(r)\,RR(r)}{[DR(r)]^2}$$

donde

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

$$D_1 D_2 = (1 + \varphi_1 + \varphi_2 + \xi)\, R_1 R_2$$

donde $\varphi = \frac{\langle\langle W\, W(r)\,\delta(r)\rangle\rangle}{\langle\langle W(r)\, W(r)\rangle\rangle}$

y $\xi^2(r) = \frac{\langle\langle W(r)\, W(r)\, \delta(r)\, \delta(r)\rangle\rangle}{\langle\langle W(r)\, W(r)\rangle\rangle}$

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entonces

$$DD(r)\,RR(r) = (1+\varphi_1+\varphi_2+\xi)\,R_1 R_2^2$$

y finalmente

$$DR(r) = \int n_1 w_1 dV_1 \int \bar{n}_2 w_2 dV_2$$

pero $n = \bar{n}(1+\delta)$

$$DR(r) = \int n_1 w_1 dV_1 \int \bar{n}_2 w_2 dV_2$$

$$= \int \bar{n}_1 (1+\delta_1) w_1 dV_1 \int \bar{n}_2 w_2 dV_2$$

$$= \bar{n}^2 \iint (1+\delta_1) w_1 w_2 dV_1 dV_2$$

$$= \bar{n}^2 (\langle\langle w_1 w_2 \rangle\rangle + \langle w_1 w_2 \delta_1 \rangle\rangle)$$

así

$$[DR(r)]^2 = \bar{n}^4 (\langle\langle w_1 w_2 \rangle\rangle + \langle w_1 w_2 \delta_1 \rangle\rangle)^2$$

$$= \bar{n}^4 (1+\varphi_1)^2 \langle\langle w_1 w_2 \rangle\rangle$$

$$\xi_H^{(2)}(r) = \frac{(1+\varphi_1+\varphi_2+\xi)\,\bar{n}^4 \cancel{\langle w_1 w_2 \rangle\rangle^2}}{\bar{n}^4 (1+\varphi_1)^2 \cancel{\langle\langle w_1 w_2 \rangle\rangle^2}}$$

$$\boxed{\xi_H^{(2)} = \frac{1+\varphi_1+\varphi_2+\xi}{\bar{n}^4 (1+\varphi_1)^2}}$$

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Repitiendo el proceso anterior para el estimador de Landy-Szalay

$$\xi_{LS}^{(2)} = 1 + \frac{1}{N_{est}^2}\frac{DD(r)}{RR(r)} - \frac{2}{N_{est}}\frac{DR(r)}{RR(r)}$$

donde $\frac{1}{N_{est}} = \frac{1}{n_{est}} = \frac{1}{(1+\xi)^2}$

y como ya sabemos

$R_1R_2 = \bar{n}^2 \langle\langle W_1 W_2\rangle\rangle$

$D_1D_2 = (1+\varphi_1+\varphi_2+\xi)R_1R_2$

$DR(r) = \bar{n}^2(1+\varphi_1)\langle\langle W_1W_2\rangle\rangle$

entonces tenemos

$$\xi_{LS}^{(2)} = 1 + \frac{1}{(1+\bar{\delta})^2}(1+\varphi_1+\varphi_2+\xi) - \frac{2}{(1+\bar{\delta})}\frac{\bar{n}^2(1+\varphi_1)\langle\langle W_1W_2\rangle\rangle}{\bar{n}^2\langle\langle W_1W_2\rangle\rangle}$$

$$= 1 + \frac{1}{(1+\bar{\delta})^2}(1+\varphi_1+\varphi_2+\xi) - \frac{2}{(1+\bar{\delta})}(1+\varphi_1)$$

$$\boxed{\xi_{LS}^{(2)} = 1 + \xi_H^{(2)}\frac{(1+\varphi_1)^2}{(1+\bar{\delta})^2} - 2\frac{(1+\varphi_1)}{(1+\bar{\delta})}}$$