Gain Effects

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single wire asymmetry

$$A_1 = \frac{g_{amp}g_{gas}I^{\uparrow} - g_{amp}g_{gas}I^{\downarrow}}{g_{amp}g_{gas}I^{\uparrow} + g_{amp}g_{gas}I^{\downarrow}} \tag{1}$$

$$= \frac{g_{amp}g_{gas}}{g_{amp}g_{gas}} \frac{I^{\uparrow} - I^{\downarrow}}{I^{\uparrow} + I^{\downarrow}} \tag{2}$$

$$= \frac{I^{\uparrow} - I^{\downarrow}}{I^{\uparrow} + I^{\downarrow}} \tag{3}$$

two wire asymmetry

$$R_{ij}^{\uparrow/\downarrow} = \frac{g_{amp,i} g_{gas,i} I_i^{\uparrow/\downarrow}}{g_{amp,j} g_{gas,j} I_j^{\uparrow/\downarrow}} \tag{4}$$

$$A_2 = \frac{R_{ij}^{\uparrow} - R_{ij}^{\downarrow}}{R_{ij}^{\uparrow} + R_{ij}^{\downarrow}} \tag{5}$$

$$= \frac{\frac{g_{amp,i} g_{gas,i} I_i^{\uparrow}}{g_{amp,j} g_{gas,j} I_j^{\uparrow}} - \frac{g_{amp,i} g_{gas,i} I_i^{\downarrow}}{g_{amp,j} g_{gas,j} I_j^{\downarrow}}}{\frac{g_{amp,i} g_{gas,i} I_i^{\uparrow}}{g_{amp,j} g_{gas,j} I_j^{\uparrow}} + \frac{g_{amp,i} g_{gas,i} I_i^{\downarrow}}{g_{amp,j} g_{gas,j} I_j^{\downarrow}}} \tag{6}$$

$$= \frac{\frac{g_{amp,i} g_{gas,i}}{g_{amp,j} g_{gas,j}}}{\frac{g_{amp,i} g_{gas,i}}{g_{amp,j} g_{gas,j}}} \frac{\frac{I_i^{\uparrow}}{I_j^{\uparrow}} - \frac{I_i^{\downarrow}}{I_j^{\downarrow}}}{\frac{I_i^{\uparrow}}{I_j^{\uparrow}} + \frac{I_i^{\downarrow}}{I_j^{\downarrow}}} = \qquad = \frac{\frac{I_i^{\uparrow}}{I_j^{\uparrow}} - \frac{I_i^{\downarrow}}{I_j^{\downarrow}}}{\frac{I_i^{\uparrow}}{I_j^{\uparrow}} + \frac{I_i^{\downarrow}}{I_j^{\downarrow}}} \tag{7}$$