It is the algorithm for tracking the phase change in the I/Q-demodulation scheme. Assume that the phase difference between the two arms of the interferometer at a moment t is ϕ_i and the output signals from the I and Q channels are $I_i = v_0 \cos\phi_i$ and $Q_i = v_0 \sin\phi_i$, respectively. Then at the next moment $t + \Delta t$, the I and Q signals become

$$I_{i+1} = v_0 \cos(\phi_i + \Delta\phi_i) \approx v_0 [\cos\phi_i - \Delta\phi_i \sin\phi_i] = I_i - Q_i \Delta\phi_i$$

and

$$Q_{i+1} = v_0 \sin(\phi_i + \Delta\phi_i) \approx v_0 [\sin\phi_i + \Delta\phi_i \cos\phi_i] = Q_i + \Delta\phi_i I_i$$

The phase change between the two measurements is given by

$$\Delta\phi_i = -\frac{I_{i+1} - I_i}{Q_i} \qquad (1)$$

or

$$\Delta\phi_i = \frac{Q_{i+1} - Q_i}{I_i} \qquad (2)$$

In principle, one can use any of above two representations but in order to avoid the 'floating point overflow' or 'divided by 0 error' in the numerical calculation we can choose the following rules:

1. If $|Q_i| \geqq |I_i|$ then choose (1) for calculating the phase difference
2. Otherwise, choose (2) for calculating the phase difference

In the next measurement, if $|Q_{i+1}| \geqq |I_{i+1}|$, then $\Delta\phi_{i+1} = -\frac{I_{i+2} - I_{i+1}}{Q_{i+1}}$, otherwise $\Delta\phi_{i+1} = \frac{Q_{i+2} - Q_{i+1}}{I_{i+1}}$.

The total phase change in consecutive measurements is therefore given by $\Delta\phi_i + \Delta\phi_{i+1} + \cdots$.