2.53

$$\sum_{n=1}^{N} \sin(\theta_n - \theta_0) = 0$$

$$\implies \sum_{n=1}^{N} (\cos\theta_0 \sin\theta_n - \cos\theta_n \sin\theta_0) = 0$$

$$\implies \cos\theta_0 \sum_{n=1}^{N} \sin\theta_n - \sin\theta_0 \sum_{n=1}^{N} \cos\theta_n = 0$$

$$\implies \cos\theta_0 \sum_{n=1}^{N} \sin\theta_n = \sin\theta_0 \sum_{n=1}^{N} \cos\theta_n$$

$$\implies \tan\theta_0 = \left\{ \frac{\sum_{n=1}^{N} \sin\theta_n}{\sum_{n=1}^{N} \cos\theta_n} \right\}$$

$$\implies \theta_0^{ML} = \tan^{-1} \left\{ \frac{\sum_{n=1}^{N} \sin\theta_n}{\sum_{n=1}^{N} \cos\theta_n} \right\}$$

which is the result in 2.184 that we wanted.