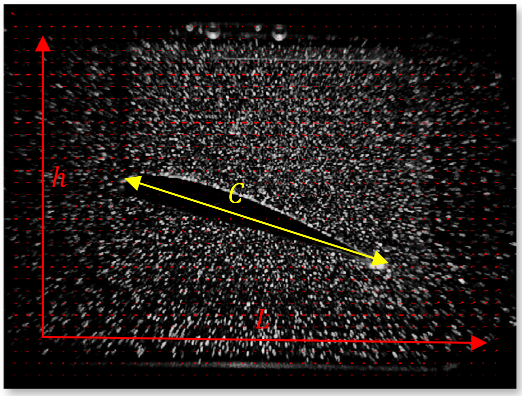
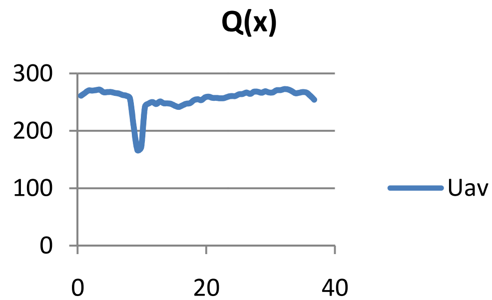
Estimation of Re for a flow over the Clark-Y





Assume that the flow through the test channel is 2D. Then the cross-sectional flow rate $Q(x)$ at an x position can be written as:

$$Q(x) = \int_0^h u(x,y)dy = \sum_{j=1}^{N} u_j(x)\Delta y$$

where $\Delta y = h/N$ then,

$$Q(x) = \frac{h}{N}\sum_{j=1}^{N} u_j(x)$$

The mean flow rate $\bar{Q}$ along the test section L is defined as:

$$\bar{Q} = \frac{1}{L}\int_0^L Q(x)dx = \frac{1}{L}\sum_{i=1}^{M} Q_i\Delta x$$

where $Q_i = Q(x_i)$ and $L = M\Delta x$ then,

$$\bar{Q} = \frac{1}{M\Delta x}\sum_{i=1}^{M} Q_i\Delta x = \frac{1}{M}\sum_{i=1}^{M} Q_i$$

The mean velocity through the test channel U_{av} is obtained as:

$$U_{av} = \frac{\bar{Q}}{h}$$

Consequently, the flow Re based on U_{av} and Clark-Y chord length C is given as:

$$Re = \frac{U_{av} \cdot C}{\nu}$$