$$Q = \sum_{i=1}^{n} Q_i = \sum_{i=1}^{n} V_i A_i \tag{2.12}$$

The procedure for estimating discharge from current meter measurements of velocities at points in the flow cross-section is illustrated by Example 2.6.

Example 2.6 Stream Discharge

The discharge at a stream location for a given stage is computed based on the current meter measurements provided below. The horizontal distance across the stream is measured from the edge of the water at one bank. Depths are measured from the water surface.

Distance, m	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0
Depth, m	0.5	2.2	3.7	4.3	3.7	2.8	2.4	1.8	1.1	0.7
Velocity, m/s										
at 0.2 depth	0.040	0.054	0.074	0.082	0.076	0.072	0.065	0.060	0.051	0.042
at 0.8 depth	0.020	0.034	0.050	0.058	0.054	0.048	0.043	0.038	0.031	0.028

Solution The cross-section is shown in Fig. 2.17 with the location of each of the current meter measurements of point velocity. Applying Eq. 2.7, the Q_i for each of the ten 1.0-m wide flow subareas are estimated and summed to obtain the total flow. The cross-section area A_i for each subarea is estimated as depth multiplied by 1-m width. The mean velocity in each subarea is estimated as the average of the flows at 0.2 and 0.8 depth.

A_i, m^2	0.5	2.2	3.7	4.3	3.7	2.8	2.4	1.8	1.1	0.7
V_i, m/s	0.030	0.044	0.062	0.070	0.065	0.060	0.054	0.049	0.041	0.035
$Q_i = V_i A_i$, m^3/s	0.0150	0.0968	0.2294	0.3010	0.2405	0.1680	0.1296	0.0882	0.0451	0.0245

$$Q = 0.0150 + 0.0968 + 0.2294 + 0.3010 + 0.2405 + 0.1680 + 0.1296 + 0.0882 + 0.0451 + 0.0245$$

$$Q = 1.34 \text{ m}^3/\text{s}$$

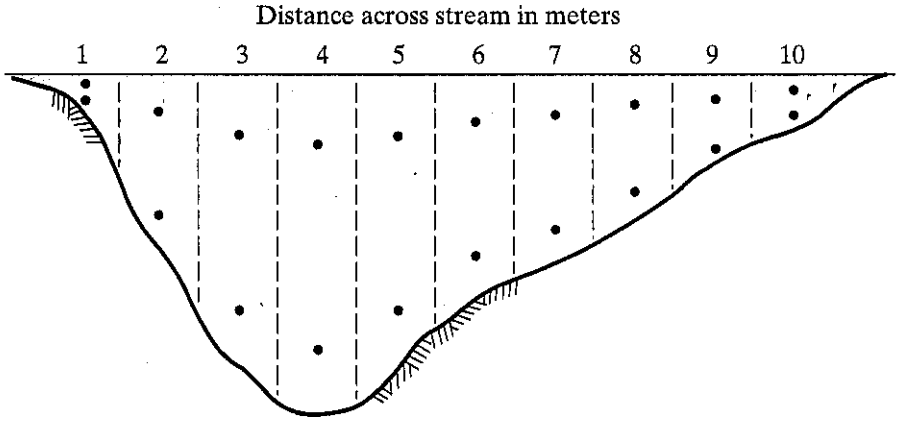

Figure 2.17 Stream channel cross-section for Example 2.6.