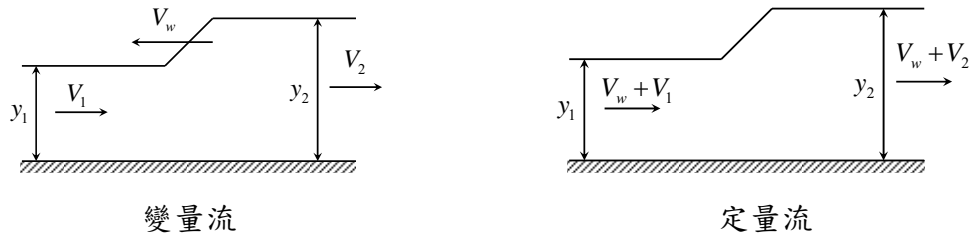


於本例中將產生正湧浪向上游傳遞之流況，將變量流轉換成定量流，如下圖，以便求解。



由連續方程式

$$q = (V_w + V_2) y_2 = (V_w + V_1) y_1$$

重新排列可得

$$V_w = \frac{V_1 y_1 - V_2 y_2}{y_2 - y_1} \quad (1)$$

式中 $V_1 y_1 = \frac{Q_1}{B} = \frac{24}{4} = 6 \text{ m}^2/\text{s}$, $V_2 y_2 = \frac{Q_2}{B} = \frac{16}{4} = 4 \text{ m}^2/\text{s}$, $y_1 = 2 \text{ m}$, 代入(1)式

$$V_w = \frac{6 - 4}{y_2 - 2} = \frac{2}{y_2 - 2} \quad (2)$$

另由動量方程式

$$\frac{1}{2} \gamma y_1^2 - \frac{1}{2} \gamma y_2^2 = \rho q [(V_w + V_2) - (V_w + V_1)] = \rho q (V_2 - V_1)$$

整理可得

$$q^2 = \frac{g}{2} y_1 y_2 (y_1 + y_2) \quad (3)$$

將 $q = (V_w + V_1) y_1$ 代入(3)式得湧浪之速度為

$$V_w = \sqrt{\frac{g}{2} \frac{y_2}{y_1} (y_1 + y_2)} - V_1 \quad (4)$$

合併(2)式與(4)式，並將已知數值代入，其中 $V_1 = \frac{Q_1}{B y_1} = \frac{24}{4 \times 2} = 3 \text{ m/s}$

$$\frac{2}{y_2 - 2} = \sqrt{\frac{9.81}{2} \frac{y_2}{2} (2 + y_2)} - 3 \quad (5)$$

由試誤法可得 $y_2 \approx 2.7513$ ，故湧浪高度 h 為

$$h = y_2 - y_1 = 2.7513 - 2 = 0.7513 \text{ m} \quad (\text{Ans})$$

湧浪之絕對速度 V_w 為

$$V_w = \frac{2}{2.7513 - 2} = 2.662 \text{ m/s} \quad (\text{Ans})$$