Important Components of a Hydrograph Formulas PDF

Formulas
Examples
with Units

List of 12
Important Components of a Hydrograph Formulas

1) Discharge at Initial Time Formula

Evaluate Formula

Formula

$$Q_0 = \frac{Q_t}{K_r^{\,t}}$$

Example with Units

$$49.9984\,\text{m}^3/\text{s} = \frac{1.4162\,\text{m}^3/\text{s}}{0.1683^{\,2\,\text{s}}}$$

2) Discharge at Initial Time in Alternative Form of Exponential Decay Formula

Evaluate Formula

Formula

$$Q_0 = \frac{Q_t}{\exp(-a \cdot t)}$$

Example with Units

$$49.9977\,\text{m}^3/\text{s} = \frac{1.4162\,\text{m}^3/\text{s}}{\exp(-1.782 \cdot 2\,\text{s})}$$

3) Discharge concerning Recession Constant Formula

Evaluate Formula

Formula

$$Q_t = Q_0 \cdot K_r^{\,t}$$

Example with Units

$$1.4162\,\text{m}^3/\text{s} = 50\,\text{m}^3/\text{s} \cdot 0.1683^{\,2\,\text{s}}$$

4) Discharge given Storage Formula

Evaluate Formula

Formula

$$Q_t = S \cdot a$$

Example with Units

$$178.2\,\text{m}^3/\text{s} = 100\,\text{m}^3 \cdot 1.782$$

5) Discharge in Alternative Form of Exponential Decay Formula

Evaluate Formula

Formula

$$Q_t = Q_0 \cdot \exp(-a \cdot t)$$

Example with Units

$$1.4163\,\text{m}^3/\text{s} = 50\,\text{m}^3/\text{s} \cdot \exp(-1.782 \cdot 2\,\text{s})$$

6) Drainage Area given Time Interval from Peak in Straight-Line Method of Baseflow Separation Formula

Evaluate Formula

Formula

$$A_D = \left(\frac{N}{0.83}\right)^{\frac{1}{0.2}}$$

Example with Units

$$616.9015\,\text{m}^2 = \left(\frac{3\,\text{d}}{0.83}\right)^{\frac{1}{0.2}}$$

7) Recession Constant Formula

Evaluate Formula

Formula

$$K_r = K_{rs} \cdot K_{ri} \cdot K_{rb}$$

Example

$$0.1683 = 0.2 \cdot 0.85 \cdot 0.99$$

8) Recession Constant for Base Flow Formula

Evaluate Formula

Formula

$$K_{rb} = \frac{K_r}{K_{rs}} \cdot K_{ri}$$

Example

$$0.7153 = \frac{0.1683}{0.2} \cdot 0.85$$

9) Recession Constant for Interflow Formula

Evaluate Formula

Formula

$$K_{ri} = \frac{K_r}{K_{rs}} \cdot K_{rb}$$

Example

$$0.8331 = \frac{0.1683}{0.2} \cdot 0.99$$

10) Recession Constant for Surface Storage Formula

Evaluate Formula

Formula

$$K_{rs} = \frac{K_r}{K_{ri}} \cdot K_{rb}$$

Example

$$0.196 = \frac{0.1683}{0.85} \cdot 0.99$$

11) Storage Remaining at any Time t Formula

Evaluate Formula

Formula

$$S = \frac{Q_t}{a}$$

Example with Units

$$0.7947\,\text{m}^3 = \frac{1.4162\,\text{m}^3/\text{s}}{1.782}$$

12) Time Interval from Peak in Straight-Line method of Baseflow Separation Formula

Evaluate Formula

Formula

$$N = 0.83 \cdot A_D^{0.2}$$

Example with Units

$$2.9834\,\text{d} = 0.83 \cdot 600\,\text{m}^2{}^{0.2}$$

Variables used in list of Components of a Hydrograph Formulas above

- **a** Constant 'a' for Discharge in Exponential Decay
- A_D Drainage Area *(Square Meter)*
- K_r Recession Constant
- K_{rb} Recession Constant for Baseflow
- K_{ri} Recession Constant for Interflow
- K_{rs} Recession Constant for Surface Storage
- **N** Time Interval *(Day)*
- Q_0 Discharge at Time t=0 *(Cubic Meter per Second)*
- Q_t Discharge at Time t *(Cubic Meter per Second)*
- **S** Total Storage in Channel Reach *(Cubic Meter)*
- **t** Time *(Second)*

Constants, Functions, Measurements used in list of Components of a Hydrograph Formulas above

- Functions: **exp**, exp(Number)
  n an exponential function, the value of the function changes by a constant factor for every unit change in the independent variable.
- Measurement: **Time** in Second (s), Day (d)
  Time Unit Conversion
- Measurement: **Volume** in Cubic Meter (m^3)
  Volume Unit Conversion
- Measurement: **Area** in Square Meter (m^2)
  Area Unit Conversion
- Measurement: **Volumetric Flow Rate** in Cubic Meter per Second (m^3/s)
  Volumetric Flow Rate Unit Conversion

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