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Steady Flow into a Well Formulas

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List of 10 Steady Flow into a Well Formulas

Steady Flow into a Well

1) Change in Piezometric Head

Open Calculator

fx $$dh = V_r \cdot \frac{dr}{K}$$

ex $$1.25\text{m} = 15.00\text{cm/s} \cdot \frac{0.25\text{m}}{3.0\text{cm/s}}$$

2) Change in Radial Distance

Open Calculator

fx $$dr = K \cdot \frac{dh}{V_r}$$

ex $$0.25\text{m} = 3.0\text{cm/s} \cdot \frac{1.25\text{m}}{15.00\text{cm/s}}$$

3) Cylindrical Surface through which Velocity of Flow Occurs

Open Calculator

fx $$S = 2 \cdot \pi \cdot r \cdot H_a$$

ex $$848.23\text{m}^2 = 2 \cdot \pi \cdot 3\text{m} \cdot 45\text{m}$$

4) Discharge Entering Cylindrical Surface to Well Discharge

Open Calculator

fx $$Q = (2 \cdot \pi \cdot r \cdot H_a) \cdot \left(K \cdot \left(\frac{dh}{dr}\right)\right)$$

ex $$127.2345\text{m}^3/\text{s} = (2 \cdot \pi \cdot 3\text{m} \cdot 45\text{m}) \cdot \left(3.0\text{cm/s} \cdot \left(\frac{1.25\text{m}}{0.25\text{m}}\right)\right)$$

5) Discharge Observed at Edge of Zone of Influence

Open Calculator

fx $$Q_{iz} = 2 \cdot \pi \cdot \tau \cdot \frac{s'}{\ln\left(\frac{r_2}{r_1}\right)}$$

ex $$2.538122\text{m}^3/\text{s} = 2 \cdot \pi \cdot 1.4\text{m}^2/\text{s} \cdot \frac{0.2\text{m}}{\ln\left(\frac{10.0\text{m}}{5.0\text{m}}\right)}$$

6) Equilibrium Equation for Flow in Confined Aquifer at Observation Well

Open Calculator

fx $$Q = \frac{2 \cdot \pi \cdot \tau \cdot (h_2 - h_1)}{\ln\left(\frac{r_2}{r_1}\right)}$$

ex $$126.9061\text{m}^3/\text{s} = \frac{2 \cdot \pi \cdot 1.4\text{m}^2/\text{s} \cdot (25\text{m} - 15\text{m})}{\ln\left(\frac{10.0\text{m}}{5.0\text{m}}\right)}$$

7) Thiem's equilibrium equation for steady flow in confined aquifer

Open Calculator

fx $$Q_{sf} = 2 \cdot \pi \cdot K \cdot H_a \cdot \frac{h_2 - h_1}{\ln\left(\frac{r_2}{r_1}\right)}$$

ex $$122.3737\text{m}^3/\text{s} = 2 \cdot \pi \cdot 3.0\text{cm/s} \cdot 45\text{m} \cdot \frac{25\text{m} - 15\text{m}}{\ln\left(\frac{10.0\text{m}}{5.0\text{m}}\right)}$$

8) Transmissivity when Discharge and Drawdowns are considered

Open Calculator

fx $$\tau = Q_{sf} \cdot \frac{\ln\left(\frac{r_2}{r_1}\right)}{2 \cdot \pi \cdot (H_1 - H_2)}$$

ex $$2.691754\text{m}^2/\text{s} = 122\text{m}^3/\text{s} \cdot \frac{\ln\left(\frac{10.0\text{m}}{5.0\text{m}}\right)}{2 \cdot \pi \cdot (15.0\text{m} - 10.00\text{m})}$$

9) Transmissivity when Discharge at Edge of Zone of Influence

Open Calculator

fx $$T_{iz} = \frac{Q_{sf} \cdot \ln\left(\frac{r_2}{r_1}\right)}{2 \cdot \pi \cdot s'}$$

ex $$67.29386\text{m}^2/\text{s} = \frac{122\text{m}^3/\text{s} \cdot \ln\left(\frac{10.0\text{m}}{5.0\text{m}}\right)}{2 \cdot \pi \cdot 0.2\text{m}}$$

10) Velocity of Flow by Darcy's Law at Radical Distance

Open Calculator

fx $$V_r = K \cdot \left(\frac{dh}{dr} \right)$$

ex $$15\text{cm/s} = 3.0\text{cm/s} \cdot \left(\frac{1.25\text{m}}{0.25\text{m}} \right)$$

Variables Used

- **dh** Change in Piezometric Head *(Meter)*
- **dr** Change in Radial Distance *(Meter)*
- h_1 Piezometric Head at Radial Distance r1 *(Meter)*
- H_1 Drawdown at Start of Recuperation *(Meter)*
- h_2 Piezometric Head at Radial Distance r2 *(Meter)*
- H_2 Drawdown at a Time *(Meter)*
- H_a Width of Aquifer *(Meter)*
- **K** Coefficient of Permeability *(Centimeter per Second)*
- **Q** Discharge Entering Cylindrical Surface into Well *(Cubic Meter per Second)*
- Q_{iz} Discharge Observed at Edge of Zone of Influence *(Cubic Meter per Second)*
- Q_{sf} Steady Flow in a Confined Aquifer *(Cubic Meter per Second)*
- **r** Radial Distance *(Meter)*
- r_1 Radial Distance at Observation Well 1 *(Meter)*
- r_2 Radial Distance at Observation Well 2 *(Meter)*
- **s'** Possible Drawdown in Confined Aquifer *(Meter)*
- **S** Surface through which the Velocity of Flow Occurs *(Square Meter)*
- T_{iz} Transmissivity at Edge of Zone of Influence *(Square Meter per Second)*
- V_r Velocity of Flow at Radial Distance *(Centimeter per Second)*
- **T** Transmissivity *(Square Meter per Second)*

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Function: **ln**, ln(Number)
  The natural logarithm, also known as the logarithm to the base e, is the inverse function of the natural exponential function.
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Area** in Square Meter (m²)
  Area Unit Conversion
- Measurement: **Speed** in Centimeter per Second (cm/s)
  Speed Unit Conversion
- Measurement: **Volumetric Flow Rate** in Cubic Meter per Second (m³/s)
  Volumetric Flow Rate Unit Conversion
- Measurement: **Kinematic Viscosity** in Square Meter per Second (m²/s)
  Kinematic Viscosity Unit Conversion

Check other formula lists

- **Aquifer Analysis and Properties Formulas**
- **Coefficient of Permeability Formulas**
- **Distance-Drawdown Analysis Formulas**
- **Open Wells Formulas**
- **Steady Flow into a Well Formulas**
- **Unsteady Flow in a Confined Aquifer Formulas**

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