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Unsteady Flow in a Confined Aquifer Formulas

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List of 11 Unsteady Flow in a Confined Aquifer Formulas

Unsteady Flow in a Confined Aquifer

1) Distance from Pumping Well given Storage Coefficient

Open Calculator

fx $$r = \sqrt{\left(2.25 \cdot T \cdot \frac{t_0}{S}\right)}$$

ex $$3.004409\text{m} = \sqrt{\left(2.25 \cdot 11\text{m}^2/\text{s} \cdot \frac{31\text{s}}{85}\right)}$$

2) Drawdown

Open Calculator

fx $$s_t = \left(\frac{Q}{4 \cdot \pi \cdot T}\right) \cdot \ln\left(\frac{2.2 \cdot T \cdot t}{r^2 \cdot S}\right)$$

ex $$0.030688\text{m} = \left(\frac{3.0\text{m}^3/\text{s}}{4 \cdot \pi \cdot 11\text{m}^2/\text{s}}\right) \cdot \ln\left(\frac{2.2 \cdot 11\text{m}^2/\text{s} \cdot 130\text{s}}{(3\text{m})^2 \cdot 85}\right)$$

3) Drawdown at Time Interval 't1'

Open Calculator

$$s_1 = s_2 - \left(\left(\frac{Q}{4 \cdot \pi \cdot T}\right) \cdot \ln\left(\frac{t_2}{t_1}\right)\right)$$

$$14.99393\text{m} = 14.94\text{m} - \left(\left(\frac{3.0\text{m}^3/\text{s}}{4 \cdot \pi \cdot 11\text{m}^2/\text{s}}\right) \cdot \ln\left(\frac{10\text{s}}{120\text{s}}\right)\right)$$

4) Drawdown at Time Interval 't2'

Open Calculator

$$s_2 = \left(\left(\frac{Q}{4 \cdot \pi \cdot T}\right) \cdot \ln\left(\frac{t_2}{t_1}\right)\right) + s_1$$

$$14.94607\text{m} = \left(\left(\frac{3.0\text{m}^3/\text{s}}{4 \cdot \pi \cdot 11\text{m}^2/\text{s}}\right) \cdot \ln\left(\frac{10\text{s}}{120\text{s}}\right)\right) + 15.0\text{m}$$

5) Drawdown given Piezometric Head

Open Calculator

$$s' = H - h$$

$$0.2\text{m} = 10.0\text{m} - 9.8\text{m}$$

6) Equation for Storage Coefficient

Open Calculator

$$S = 2.25 \cdot T \cdot \frac{t_0}{r^2}$$

$$85.25 = 2.25 \cdot 11\text{m}^2/\text{s} \cdot \frac{31\text{s}}{(3\text{m})^2}$$

7) Equation for Well Function series to number of 4 digits

Open Calculator

$$W_u = -0.577216 - \ln(u) + u - \left(\frac{u^2}{2.2}!\right) + \left(\frac{u^3}{3.3}!\right)$$

ex

$$1.584921 = -0.577216 - \ln(0.13) + 0.13 - \left(\frac{(0.13)^2}{2.2}!\right) + \left(\frac{(0.13)^3}{3.3}!\right)$$

8) Initial Constant Piezometric Head given Drawdown

Open Calculator

$$H = s' + h$$

ex $10\text{m} = 0.2\text{m} + 9.8\text{m}$

9) Initial Time given Pumping Well along with Storage Coefficient

Open Calculator

$$t_0 = \frac{S \cdot r^2}{2.25 \cdot T}$$

ex $$30.90909\text{s} = \frac{85 \cdot (3\text{m})^2}{2.25 \cdot 11\text{m}^2/\text{s}}$$

10) Transmissivity about given Storage Coefficient

Open Calculator

fx $$T = \frac{S \cdot r^2}{2.25 \cdot t_0}$$

ex $$10.96774 m^2/s = \frac{85 \cdot (3m)^2}{2.25 \cdot 31s}$$

11) Well Parameter

Open Calculator

fx $$u = \frac{r^2 \cdot S}{4 \cdot T \cdot t}$$

ex $$0.133741 = \frac{(3m)^2 \cdot 85}{4 \cdot 11 m^2/s \cdot 130s}$$

Variables Used

- **h** Drawdown *(Meter)*
- **H** Initial Constant Piezometric Head *(Meter)*
- **Q** Discharge *(Cubic Meter per Second)*
- **r** Distance from Pumping Well *(Meter)*
- **s'** Possible Drawdown in Confined Aquifer *(Meter)*
- **S** Storage Coefficient
- s_1 Drawdown at Time Interval t1 *(Meter)*
- s_2 Drawdown at Time Interval t2 *(Meter)*
- s_t Total Drawdown *(Meter)*
- **t** Time Period *(Second)*
- **T** Transmissivity *(Square Meter per Second)*
- t_0 Starting Time *(Second)*
- t_1 Time of Drawdown (t1) *(Second)*
- t_2 Time of Drawdown (t2) *(Second)*
- **u** Well Parameter
- W_u Well Function of u

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.
- Function: **sqrt**, sqrt(Number)
  A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Time** in Second (s)
  Time Unit Conversion
- Measurement: **Volumetric Flow Rate** in Cubic Meter per Second (m^3/s)
  Volumetric Flow Rate Unit Conversion
- Measurement: **Kinematic Viscosity** in Square Meter per Second (m^2/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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