# Dupuit Unconfined Seepage between Two Water Bodies

Seepage per metre width through an unconfined aquifer or embankment between two water levels, with the water table height along the flow, by the Dupuit equation.

**Method:** Dupuit–Forchheimer unconfined flow with uniform recharge

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Hydraulic conductivity | 10.000 | m/d |
| Upstream saturated thickness | 12.000 | m |
| Downstream saturated thickness | 6.0000 | m |
| Flow length between the boundaries | 200.00 | m |
| Distance from the upstream boundary for the water table | 100.00 | m |
| Recharge rate (0 if none) | 0 | mm/d |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Seepage at the upstream boundary per metre width | 2.7000 | m³/(d·m) |
| Seepage at x per metre width | 2.7000 | m³/(d·m) |
| Water table height at x | 9.4868 | m |
| Water divide distance (with recharge; 0 if none) | 0 | m |

**Notes for this case**

- Dupuit assumptions: horizontal flow, hydraulic gradient equal to the water-table slope, uniform conductivity on an impermeable base. The parabola underestimates the seepage face at the outflow but the discharge is exact for these boundaries.

## Formula and method

$$q = \frac{K(h_1^2 - h_2^2)}{2L} - W\left(\frac{L}{2} - x\right), \quad h^2(x) = h_1^2 - \frac{(h_1^2 - h_2^2)x}{L} + \frac{W}{K}(L - x)x$$

### Variables

| | | |
|---|---|---|
| $K$ | Hydraulic conductivity | m/s |
| $h_1$ | Upstream saturated thickness | m |
| $h_2$ | Downstream saturated thickness | m |
| $L$ | Flow length between the boundaries | m |
| $x$ | Distance from the upstream boundary for the water table | m |
| $W$ | Recharge rate (0 if none) | m/s |
| $q$ | Seepage at the upstream boundary per metre width | m³/(s·m) |
| $q(x)$ | Seepage at x per metre width | m³/(s·m) |
| $h(x)$ | Water table height at x | m |
| $d$ | Water divide distance (with recharge; 0 if none) | m |

### Method and standards

Dupuit–Forchheimer unconfined flow.

### Assumptions and limits

- Homogeneous unconfined aquifer on a horizontal impermeable base.

## References

Dupuit–Forchheimer unconfined flow with uniform recharge

## Report details

| | |
|---|---|
| Report reference | FCC-5847-R8PT (the same inputs always give the same reference) |
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| Calculator | Dupuit Unconfined Seepage between Two Water Bodies |
| Method last reviewed | 17 November 2026 |
| Software release | FireCAD Calc, release of 22 November 2026 |
| Release checks | 3 reference cases of this calculator, computed independently, are checked on every release |

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

### This calculator online

https://calc.firecad.com/civil/hydraulics/dupuit-unconfined-seepage

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.