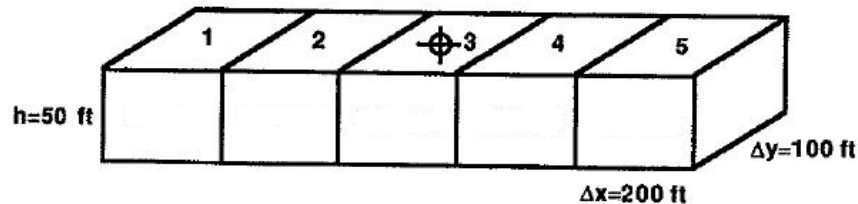


Numerical Solution of Single-Phase-Flow Equation

Consider the 1D, single-phase, block-centered grids in the horizontal reservoir as it is shown below. (1 ft = 0.3048 m)



Gridblocks 1 and 5 are located at the boundaries of the reservoir and maintained at **20000 KPa**. A production well is located in the center of Gridblock 3 and produced at a rate of **300 m³/day**. As Figure shows, all gridblocks have uniform dimensions. The permeability distribution in the reservoir is mentioned in Table.

k_{x1}	75	(md)
k_{x2}	150	(md)
k_{x3}	350	(md)
k_{x4}	125	(md)
k_{x5}	100	(md)

Rock and fluid properties for this reservoir are:
 $B_l = 1$, $C_l = 0.024 \text{ m}^2/\text{N}$, porosity = 0.25, $\mu_l = 0.005 \text{ PaS}$.

With the appropriate PDE and the corresponding finite-difference approximation, calculate the pressure distribution in the reservoir using both Implicit and Explicit FDM in just one time step (first time step). **Time scale (Δt) = 15 days**,

Assumption: B_l is constant within the pressure range of interest.