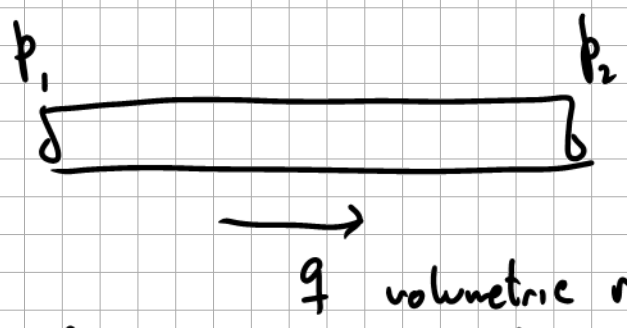
Prof. Milan Stanko (NTNU)

# flow equilibrium

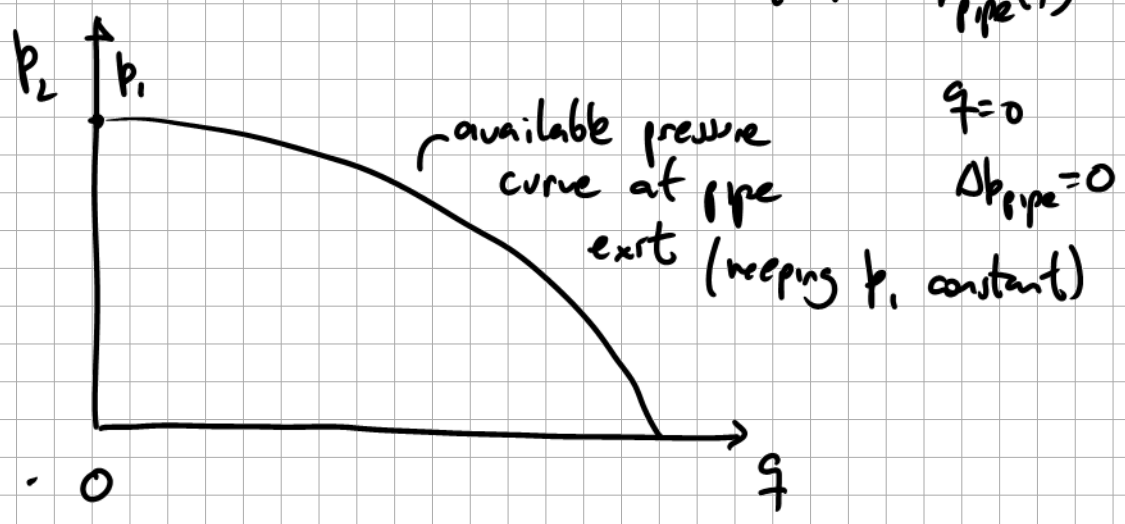



$q$ volumetric rate circulating through pipe $[m^3/d]$

horizontal pipe

1) keep $p_1$ constant, vary $q$

$$p_2 = p_1 - \Delta p_{pipe}(q)$$




$q = 0$

$\Delta p_{pipe} = 0$

2) keep $p_2$ constant, vary $q$, compute $p_1$

$$p_1 = p_2 + \Delta p_{pipe}$$

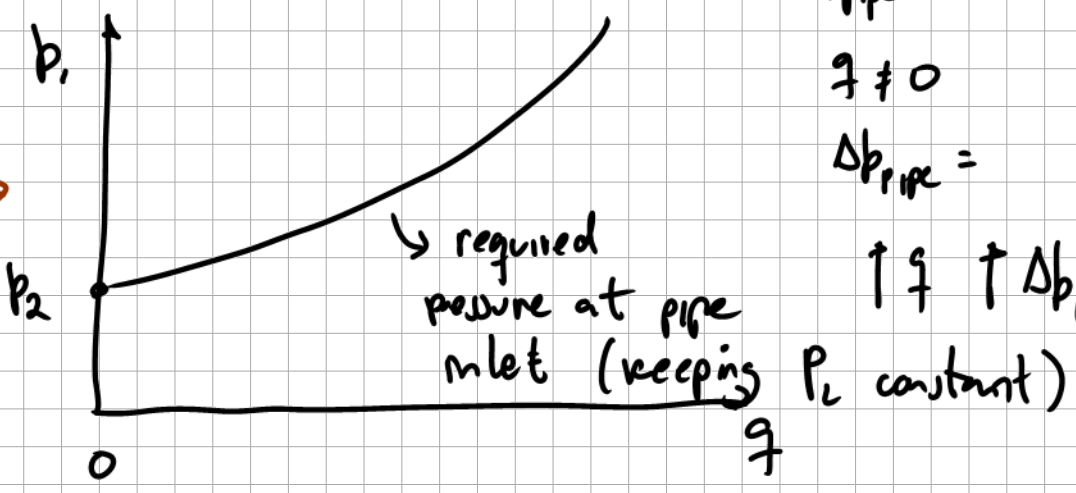
$q = 0$

$\Delta p_{pipe} = 0$

$q \neq 0$

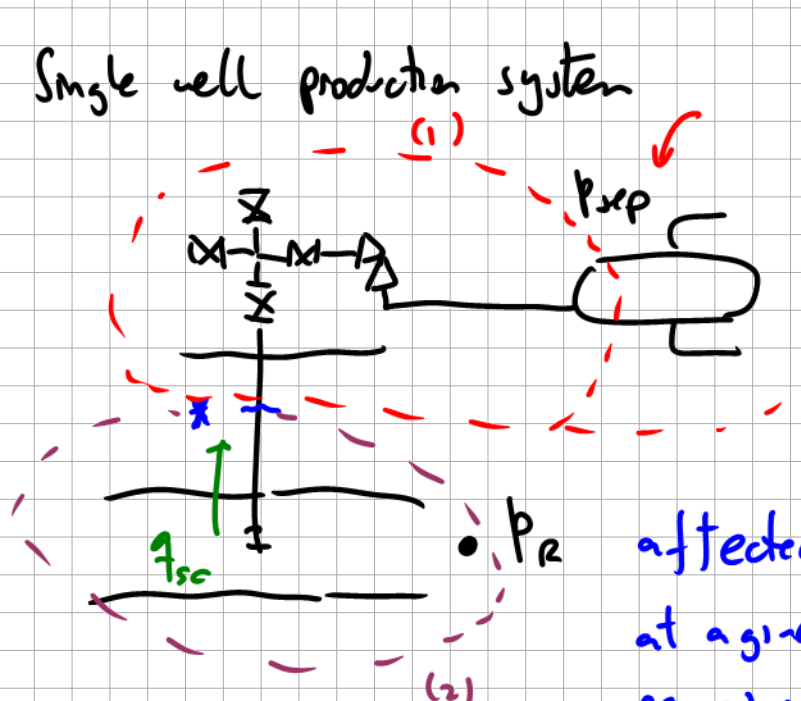
$\Delta p_{pipe} =$

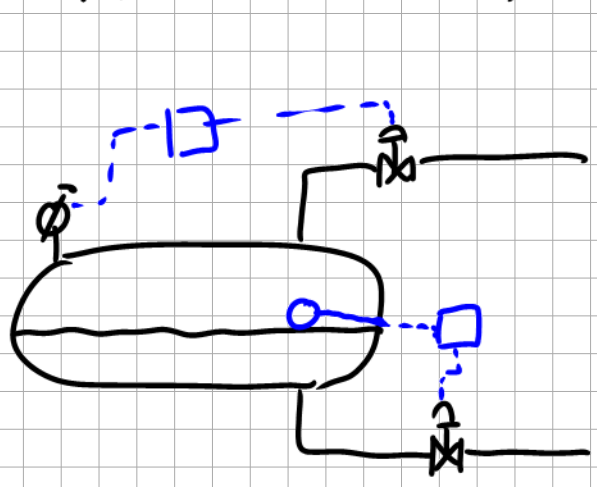
$\uparrow q \uparrow \Delta p_{pipe}$




3) provide $p_1$, $p_2$ → calculate $q$

Single well production system



affected by depletion at a given time "t" remains fairly "constant"

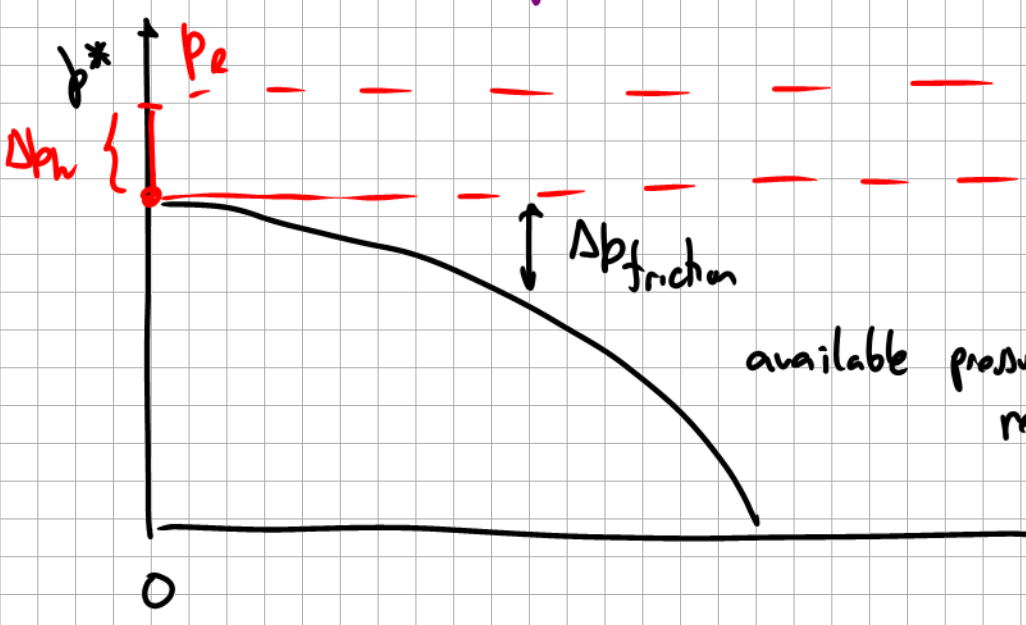
system (1) resembles case 2

required pressure at $p^*$ (seen from separator)

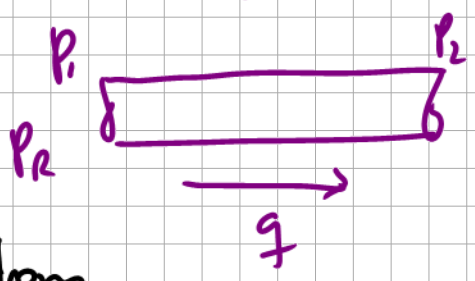

$m^3/d$ affected by $p, T$ $T_{sc} = 15.56°C$

$Sm^3/d$ unaffected by $p, T$, $p_{sc} = 1.01325$ bara

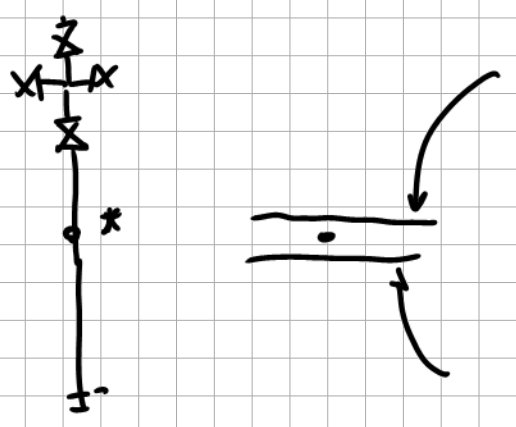
system (2) (formation and part of tubing) resembles case (1)




$p_1$ fixed, find $p_2$ by changing $q$

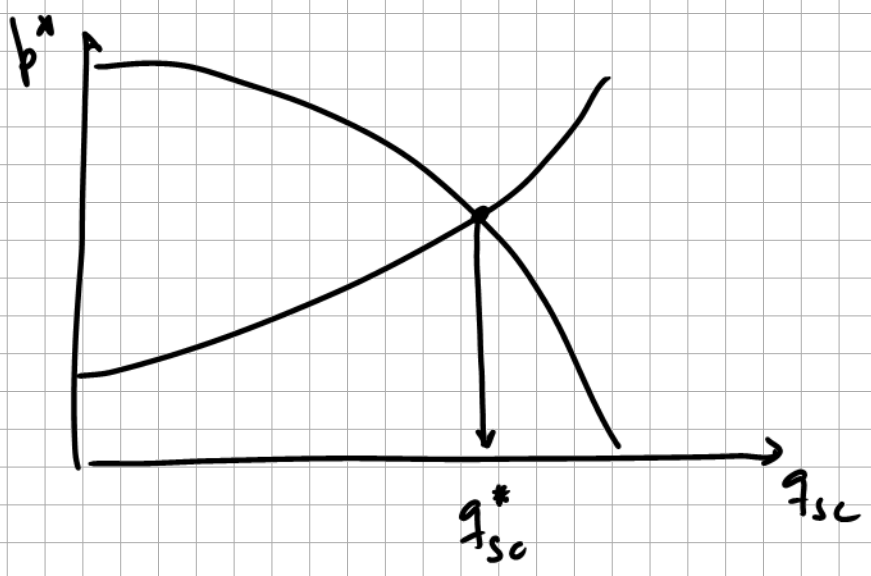



available pressure at * seen from reservoir




at $p^*$ there should be only one pressure !

overimpose the two curves




↳ equilibrium rate of the system when put together.