Note Title 12.01.2017

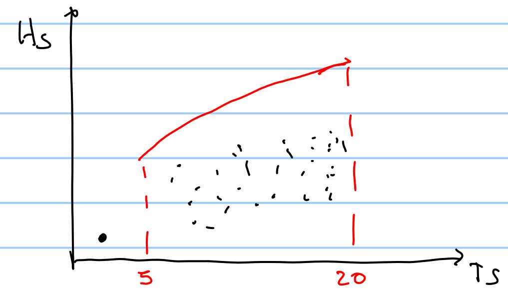
Comments about exercise set 2, problem 3

(1.5, 0.5) → (x, -)'

(17.5, 15.5)

Hs [m]	0-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25	Sum
	Spectral Peak period (T_p) [s]																							
0-1	15	290	1367	2876	3716	3527	2734	1849	1138	656	362	192	101	52	26	13	7	3	2	1	0	0	0	18927
1-2	1	81	1153	5308	12083	17323	18143	15262	10980	7053	4169	2316	1229	631	315	155	75	36	17	8	4	5	1	96348
2-3	0	2	94	1050	4532	10304	15020	15953	13457	9752	5991	3403	1795	894	426	197	88	39	17	7	3	1	1	83026
3-4	0	0	2	72	686	2782	6171	8847	9189	7493	5082	2991	1577	762	345	148	61	24	9	4	1	0	0	46246
4-5	0	0	0	2	51	433	1645	3495	4807	4750	3638	2286	1229	584	251	100	37	13	5	1	0	0	0	23327
5-6	0	0	0	0	2	39	294	1037	2069	2664	2440	1709	968	463	193	72	25	8	2	1	0	0	0	11986
6-7	0	0	0	0	0	2	32	215	692	1264	1485	1228	767	382	159	57	18	5	1	0	0	0	0	6307
7-8	0	0	0	0	0	0	2	27	157	447	730	762	555	302	130	46	14	4	1	0	0	0	0	3177
8-9	0	0	0	0	0	0	0	2	23	112	276	392	355	223	104	38	11	3	1	0	0	0	0	1540
9-10	0	0	0	0	0	0	0	0	2	19	77	160	192	148	79	31	9	2	0	0	0	0	0	719
10-11	0	0	0	0	0	0	0	0	0	2	16	50	85	85	55	24	8	2	0	0	0	0	0	327
11-12	0	0	0	0	0	0	0	0	0	0	2	12	29	40	33	18	7	2	0	0	0	0	0	143
12-13	0	0	0	0	0	0	0	0	0	0	0	2	8	15	17	12	5	2	0	0	0	0	0	61
13-14	0	0	0	0	0	0	0	0	0	0	0	0	2	5	7	6	4	1	0	0	0	0	0	25
14-15	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	2	1	0	0	0	0	0	9
15-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	4
16-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	16	373	2616	9308	21070	34410	44041	46687	42514	34212	24268	15503	8892	4587	2143	921	372	146	55	22	8	6	2	292172

VBA scripts
for i = -
for j - -
·(x,)

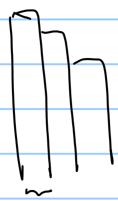


• Problem 4 Comments about exercise set 2, problem 4

time ΔNp Pr q field

0
1month 1 Pr
2 f( )

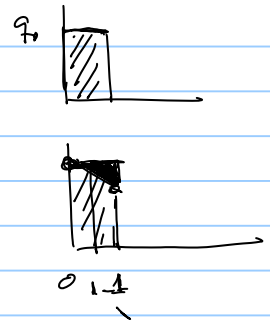
Sol



for problem 4 use rectangular integration instead of trapezoidal to avoid converging in every time step. (for calculating ΔNp)

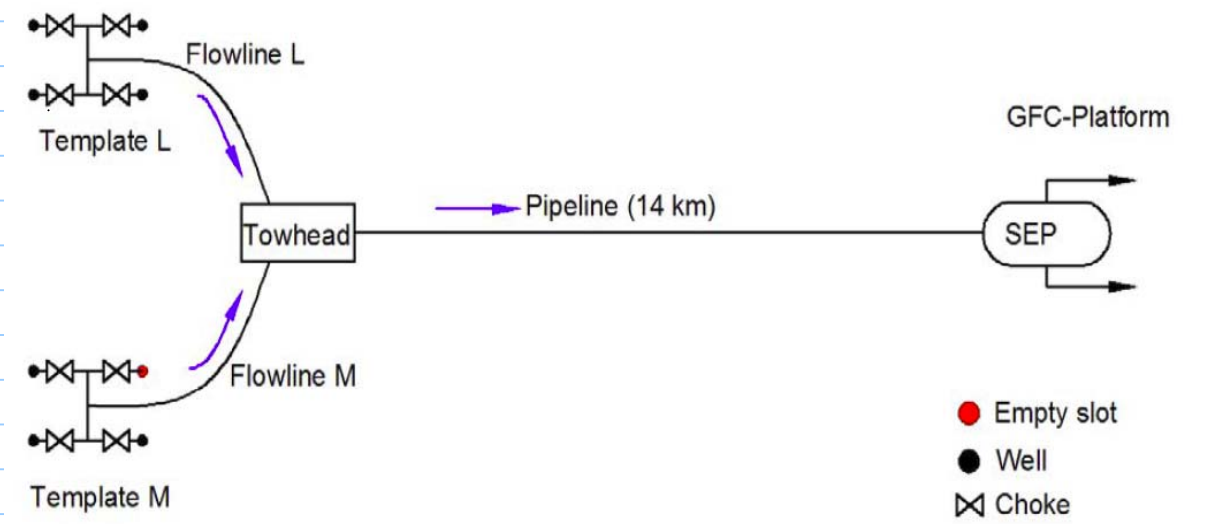
assume (Pr)
↳ qomax
↳ qofield
↳ Np —interpolate table→ Pr*

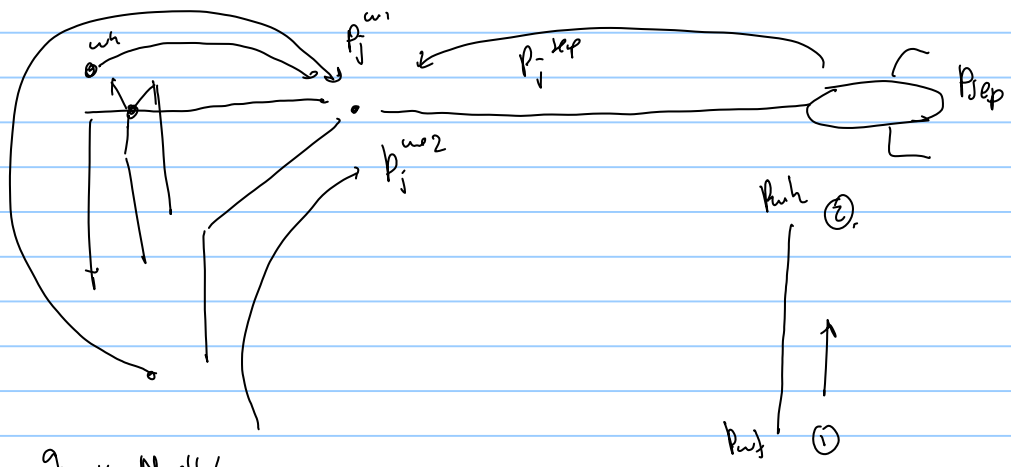
is Pr assume = Pr*

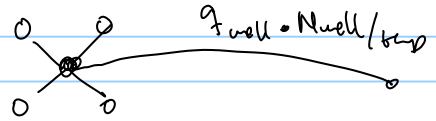


time	N_p	p_{iz}	$q_{produced}$
0	0	-	— (1) — —
1	$N_p = q_{o\,previous} \cdot (\quad - \quad) \cdot N_{delay\,mon}$		

Topic for today: network solving - class exercise







$$\frac{p_j^{w1} + p_j^{w2} + p_j^{sep}}{2} = p_{av}$$

$$p_j^{w1} - p_{av} \rightsquigarrow 0$$

TPG4230, Milan Stanko, 20170228														
Separator pressure, psep	60		bara											
	Nwells	pR [bara]	pwf [bara]	C [Sm^3/bar^2n]	n	qg [Sm^3/d]	Ct [Sm^3/bar]	S	pwh [bara]	qtemp [Sm^3/d]	Cfl [Sm^3/bar]	ptowhead[bara]	error [bara^2]	
Template L	4	145	99.6	1000	0.8	1.72E+06	38152	0.43	66.6	6.89E+06	1403054	66.5	0.0	
Template M	3	102	80.4	700	0.8	5.27E+05	41163	0.34	66.5	1.58E+06	1397663	66.5	0.0	
Pipeline									qfield [Sm^3/d]=	8.47E+06	296439	66.5	0.0	
											average p, [bara]=	66.5	0.0	=Error

the reservoir engineer want to produce 1.5 E6 from each well in template L
5 E05 from " " " " M

is that possible?

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Separator pressure, psep	60		bara											
	Nwells	pR [bara]	pwf [bara]	C [Sm^3/bar^2n]	n	qg [Sm^3/d]	Ct [Sm^3/bar]	S	pwh [bara]	qtemp [Sm^3/d]	Cfl [Sm^3/bar]	ptowhead[bara]	ptemp[bara]	Deltapchoke[bar]
Template L	4	145	108.1	1000	0.8	1.50E+06	38152	0.43	78.0	6.00E+06	1403054		65.3	12.8
Template M	3	102	81.9	700	0.8	5.00E+05	41163	0.34	67.9	1.50E+06	1397663		65.1	2.8
Pipeline									qfield [Sm^3/d]=	7.50E+06	296439	65.1		
											average p, [bara]=			

TENTATIVE PLAN

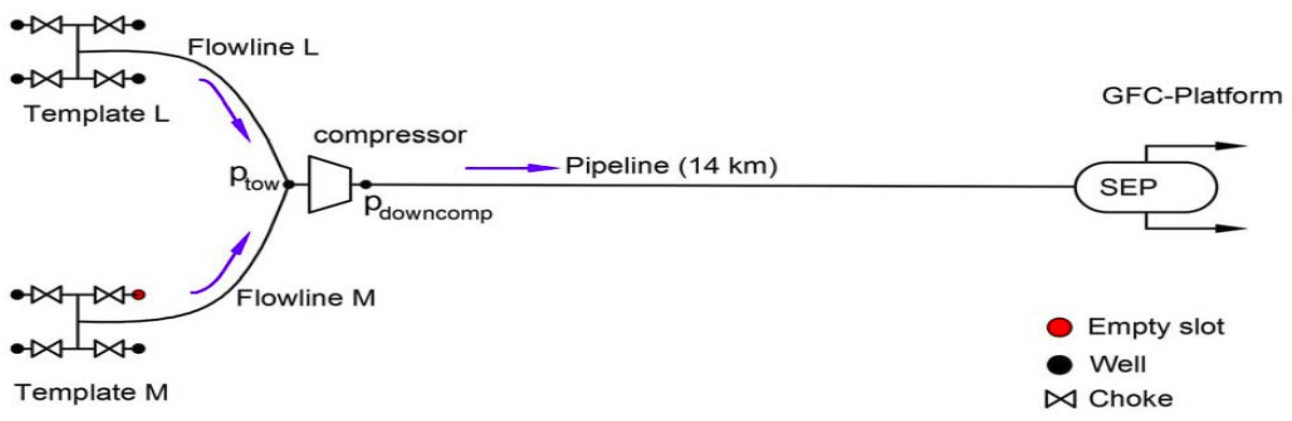
2nd exercise deadline is 06.03

3rd exercise deadline is 21.03

4th exercise deadline is 09.04 ± 90 days

5th exercise deadline is 05.05

task 2.



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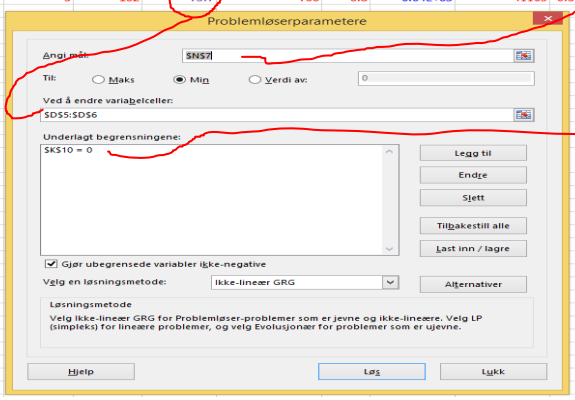
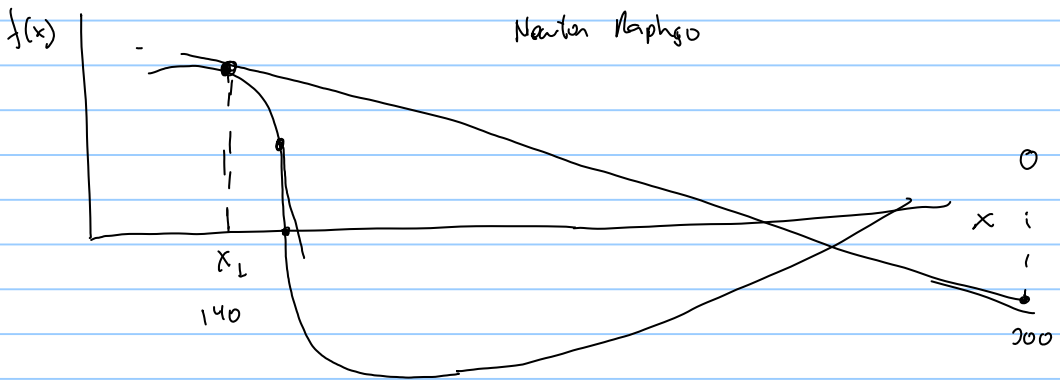
Separator pressure, psep 60 bara

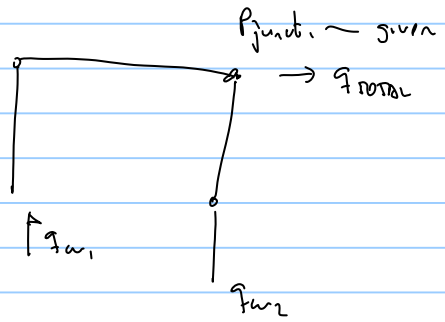
	Nwells	pR [bara]	pwf [bara]	C [Sm^3/bar^2n]	n	qg [Sm^3/d]	Ct [Sm^3/bar]	S	pwh [bara]	qtemp [Sm^3/d]	Cfl [Sm^3/bar]	ptowhead[bara]	error [bara^2]
Template L	4	145	96.5	1000	0.8	1.80E+06	38152	0.43	62.2	7.19E+06	1403054	62.0	0.0
Template M	3	102	75.7	700	0.8	6.04E+05	41163	0.34	62.0	1.81E+06	1397663	62.0	0.0
									qfield, calc [Sm^3/d]	9.00E+06	AVERAGE ptow=	62.0	9.55E-09 =sum error, tow press
Pipeline											Cfl [Sm^3/bar]	pdowncomp[bara]	
									qfield - wanted [Sm^3/d]	9.00E+06	296439	67.2	
									error -rate (calc-wanted)^2	7.65E+06			
											DP comp [bara]		



This initial setup of the solver, although sounds logical, gives VALUE! errors problems and doesn't converge. some of the bottomhole pressures tried give a negative number inside the square root. Maybe it is related with the shape of the function:
! Investigate this issue more in detail in the assignment!



An alternative approach is suggested, "Manual solution", analyzing and converging this problem separatedly:

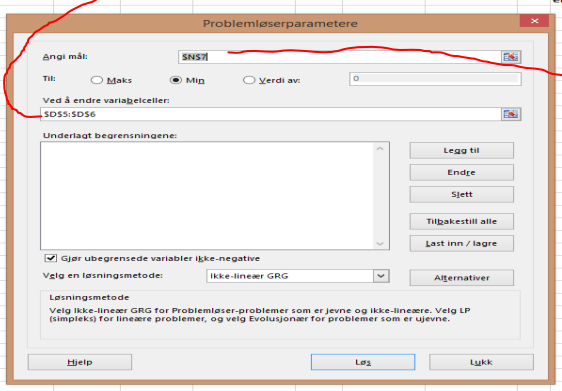


provide pav at the towhead, and take out the field rate constraint out of the solver setting. Run for several values of pav at the towhead to find the one that gives exac
09E06 Sm^3/d

TPG4230, Milan Stanko, 20170228

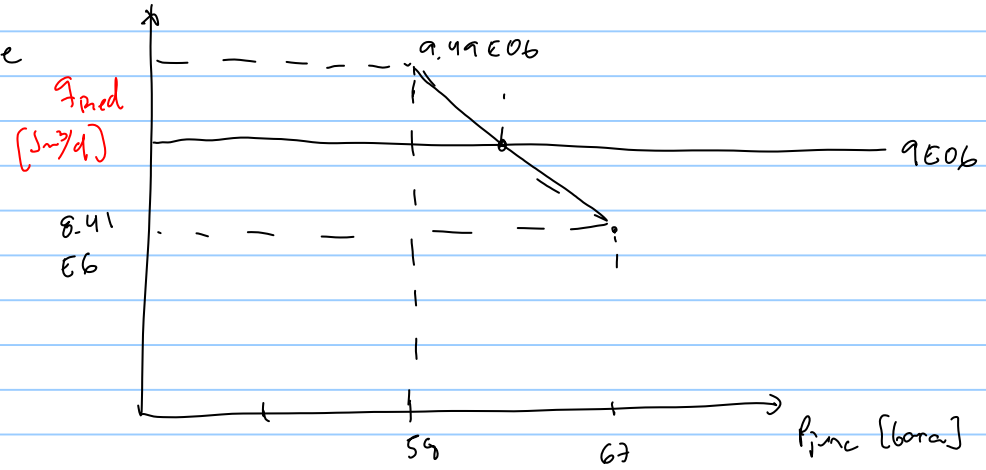
Separator pressure, psep 60 bara

	Nwells	pR [bara]	pwf [bara]	C [Sm^3/bar^2n]	n	qg [Sm^3/d]	Ct [Sm^3/bar]	S	pwh [bara]	qtemp [Sm^3/d]	Cfl [Sm^3/bar]	ptowhead[bara]	error [bara^2]
Template L	4	145	96.5	1000	0.8	1.80E+06	38152	0.43	62.2	7.19E+06	1403054	62.0	0.0
Template M	3	102	75.7	700	0.8	6.04E+05	41163	0.34	62.0	1.81E+06	1397663	62.0	0.0
									qfield, calc [Sm^3/d]	9.00E+06	AVERAGE ptow=	62.0	1.39E-08 =sum error, tow press
Pipeline											Cfl [Sm^3/bar]	pdowncomp[bara]	
									qfield - wanted [Sm^3/d]	9.00E+06	296439	67.2	
									error -rate (calc-wanted)^2	7.65E+06			
											DP comp [bara]		



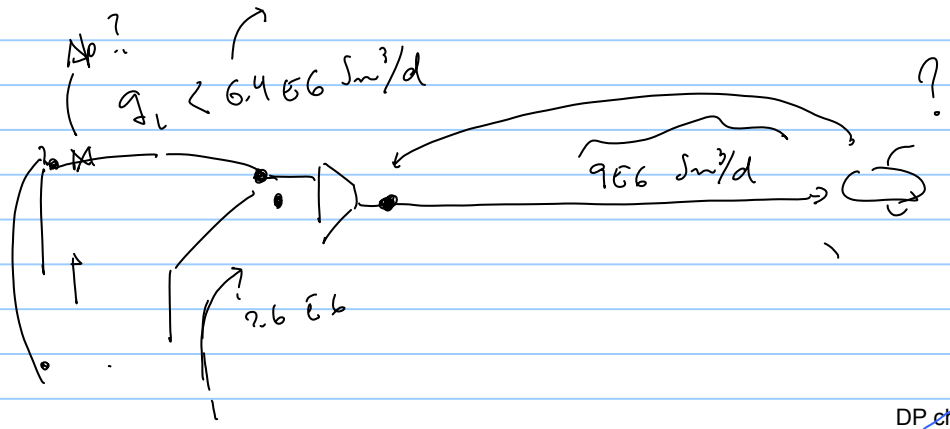
given

for our case



task 3

One way of solving the problem is to fix the rates in the system, 6.4 E06 Sm^3/d for template L, 2.6E06 Sm^3/d for template M and 9E06 Sm^3/d for the pipeline. Calculations are performed in the following way:
-Counter current calculation in pipeline from separator to compressor discharge.
-Co current calculations in template M from reservoir to suction of the compressor. Template M is NOT choked, thus w can perform calculations without problems.
-The DP of the choke in wells of template L is unknown. So, co-current calculations have to be carried from reservoir t wellhead, to find pressure upstream the choke and counter current calculations from the compressor suction (towheac the template (downstream the choke) the difference in pressure is the choke pressure drop.



Counter-current

DP choke = pwh-ptemp

Co-current

given

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Separator pressure, psep	60		bara											
	Nwells	pR [bara]	pwf [bara]	C [Sm^3/bar^2n]	n	qg [Sm^3/d]	Ct [Sm^3/bar]	S	pwh [bara]	Ptemp [bara]	Deltapchoke [bara]	qtemp [Sm^3/d]	Cfl [Sm^3/bar]	ptowhead[bara]
Template L	4	145	104.4	1000	0.8	1.60E+06	38152	0.43	73.3	41.8	31.5	6.40E+06	1403054	41.5
Template M	3	102	55.3	700	0.8	8.67E+05	41163	0.34	41.6	41.6	0.0	2.60E+06	1397663	41.5
											qfield, calc [Sm^3/d]	9.00E+06	AVERAGE ptow=	
													Cfl [Sm^3/bar]	pdowncomp[bara]
Pipeline											qfield - wanted [Sm^3/d]	9.00E+06	296439	67.2
											error -rate			
													DP comp [bara]	25.7

Co-current

counter-current