Howto run the program

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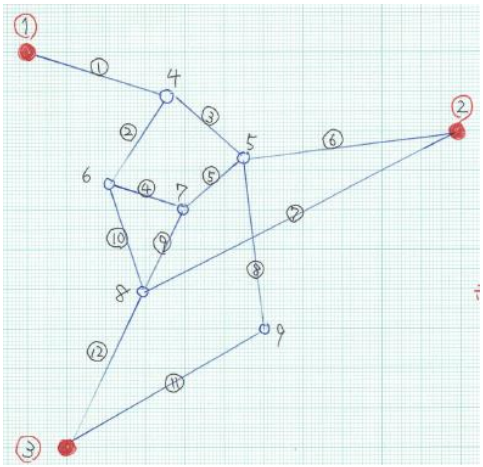
Source program	tube.f95	
Input file	tube.txt	
	resor.dat	
Output file	tnumber.dat	just checking the tube.txt
	output.dat	final results
	outpute.dat	final results without convergence

1. Make pipe network image



2. Edit tube.txt with the help of the above network image

①	1	4	593	管番号、両端節点番号、その管の λ
②	4	6	294	
③	4	5	392	tube ③ has node 4 and 5. This node number is exchangeable. ③ 5, 4 is OK
④	6	7	943	
⑤	5	7	692	
⑥	5	2	893	
⑦	2	8	494	
⑧	5	9	295	
⑨	7	8	315	
⑩	6	8	293	
⑪	9	3	592	
⑩	8	3	491	

3. Edit resor.dat to fix boundary conditions

1 25.0 ← head of the lake 1

2 23.0 ← head of the lake 2

3 18.0 ← head of the lake 3

4. Compilation

Make your work folder and copy tube.f95, tube.txt, resor.dat to the folder. Change the directory to the work folder by cd command.

> **gfortran tube.f95**

Stay the directory.

5. Execution

> **a.exe**

6. Check final results output.dat

①	1	4	25.00	22.29	0.0676	node 4 has head level 22.29m, flow rate 0.0676m3/s from 1 to 4
②	4	6	22.29	21.95	0.0342	
③	4	5	22.29	21.85	0.0335	
④	6	7	21.95	21.84	0.0105	
⑤	5	7	21.85	21.84	0.0036	
⑥	5	2	21.85	23.00	-0.0358	node 5: 21.85m, node 2:23.00(Lake), flow rate 0.0358 from 2 to 5
⑦	2	8	23.00	21.78	0.0497	
⑧	5	9	21.85	20.57	0.0658	
⑨	7	8	21.84	21.78	0.0141	
⑩	6	8	21.95	21.78	0.0238	
⑪	9	3	20.57	18.00	0.0659	
⑩	8	3	21.78	18.00	0.0877	

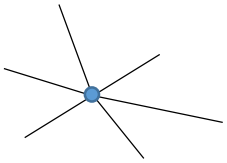
You can solve your own problems by editing tube.txt and resor.dat Total maximum number of the node and tube numbers are 100 for both.

At the head of tube.f95

integer :: ntn(100,10),nb(100),ne(100),ind(100),ntl(100,10) ! data max nodes 100, max tube 100

real :: ram(100),H(100)

If you want to change the number, it is ok. In the program, the array, ntn(100,10),ntl(100.10) has number 10. The number “10” means maximum number of tubes or nodes connected to a node. It is changeable. However, I believe 10 is enough for the real case study.



You can modify the values of source code, shown in the next row

real,parameter :: alfa=0.05,emin=0.0001 ! iteration check, alfa value is important?

If you change the value alfa smaller, convergence takes time.

If you change the value emin smaller, you can get more precise convergence calculation.