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Transient Flow Analysis for the Management of Water Pipeline Network Systems

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Œ (Minoru Suzuki) U ï 'v ´ (Shota Miyake)

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S \ G •>* • © « ¸ Ò _ | •0£'ì) Ý c>* #Ý V (^0£'ì(- Ø † q 0£'ì(-8¸ Ò K • † qŠ•Š°‹€ f q€àÆa· } _ qî `æ q, †
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Synopsis :
KSC developed a computer program of the transient flow analysis for water pipeline network systems. This program can simulate transient phenomena in a water pipeline including valves, pumps, reservoirs, and leak points. In order to check the accuracy of this program, a field experiment was executed, using a real water transmission pipeline in Ishikawa Prefecture. Numerical analysis shows good agreement between experimental data and simulated results within the maximum error of 3.7% in pressure. This program can play an important role in the management of a large-scale water pipeline network as one of the application systems of the "Lifeline Information Management System (LIMAS)", which is also developed by KSC with computer mapping techniques. This flow analysis program will extend the applicability of LIMAS to many fields of waterworks such as future planning of water supply, short-term flow prediction in daily operation, and leak flow control.

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水道施設管理のための水理解析システムの開発*

川崎製鉄技報
23 (1991) 1, 49-55


Mapping
【管路網操作】
終了
中断
拡大 縮小
スクロール
☆ 管路網操作 ☆
管路作成
管路属性操作
管路問い合せ
子プロセス起動
DEMAND

Table 1 Pipeline specifications

No.	Link ID	Dia. (mm)	Length (m)
1	L-01	1 800	1 142
2	L-02	300	217
3	L-03	1 800	829
4	L-04	1 350	274
5	L-05	1 350	274
6	L-06	1 800	264
7	L-07	1 350	286
8	L-08	1 350	286
9	L-09	1 800	4 718
10	L-10	1 350	2 319
11	L-11	1 200	641
12	L-12	700	636
13	L-13	700	636
14	L-14	1 200	783
15	L-15	1 200	2 137
16	L-16	1 600	1 378
17	L-17	350	552
18	L-18	300	654
19	L-19	1 600	2 058
20	L-20	1 350	1 701
21	L-21	300	573
22	L-22	1 350	810
23	L-23	1 000	2 875
24	L-24	1 200	490
25	L-25	1 000	2 315

には同系統図における管の仕様を示す。同図に示すように，今回計測を実施した系においては，供給点は1箇所であり，これに対して

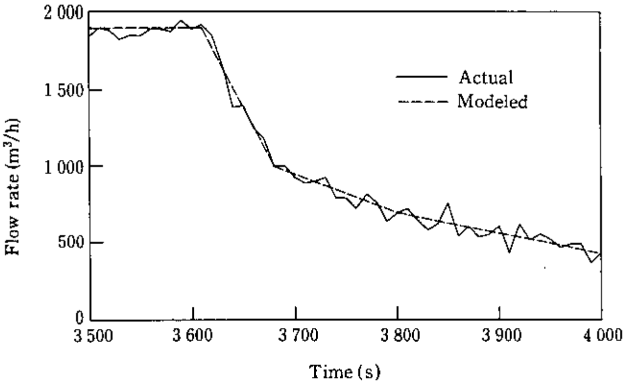


Fig. 4 Boundary condition at the demand 5

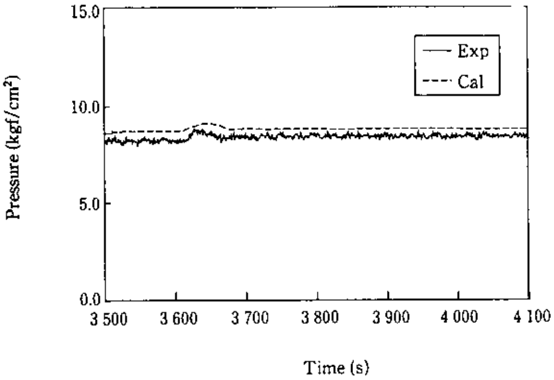
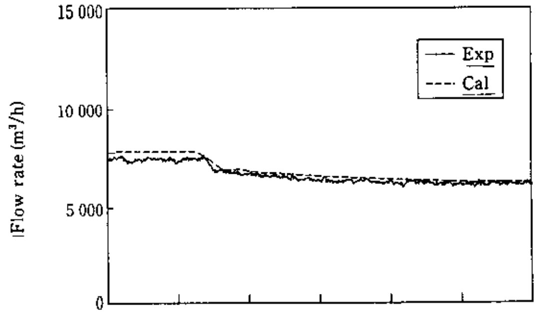
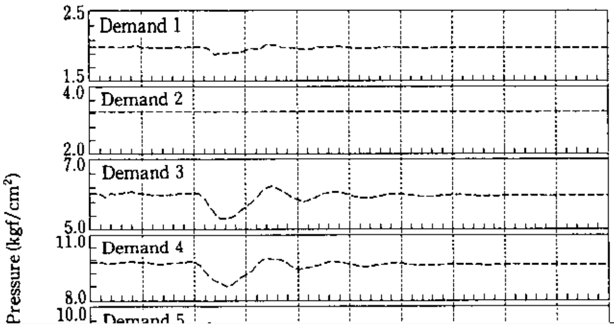


Fig. 5 Comparison of pressure profile at demand 5 between the experimental data and simulated results

同需要点における圧力変動の計測値と計算値との比較を示す。実線


15 000
10 000
5 000
0
Flow rate (m³/h)
Exp
Cal


Pressure (kgf/cm²)
2.5
1.5
Demand 1
4.0
2.0
Demand 2
7.0
5.0
Demand 3
11.0
8.0
Demand 4
10.0
Demand 5

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