
Simulation on the DUMAND single string and
the muon string by use of "SNAPLD" program.
4/15/83 S. M.

* "SNAPLD" program.

1)

"SNAPLD" program was developed by the Naval civil engineering laboratory to model and simulate the cable system in the ocean. It takes account of current, surface excitation, drag of cable and modules attached on the cable, weight of them, cable tension (include slack and retensioning of the cable) etc. etc. The program was written originally for the CDC computer and used some specifications for it. They have been already fixed up and the program got executable on our Vax. Anyone who want to calculate a cable system underwater can use this program only giving it some data on the cable system and on the environment.

* Results on the DUMAND single string.

We are very interested in how each module moves when the DUMAND single string is suffered the ocean current. Two kinds of simulation were done. One is to get a static solution and the other is to get a dynamic solution. A static solution means the string configuration after it reaches the equilibrium. A dynamic solution means the transient solution of the string after the current changes some amount from zero.

The static solution is shown in Fig 1 and the dynamic solution is shown in Fig 2. In both case, current is 10 cm/sec independent on depth. At the top of the string, four empty Benthos spheres were assumed to be used as a bouy.

* Results on the muon string.

Unfortunately we lost the muon string last spring. The simulation was done to know why we lost it.

Results are shown in Fig 3-5. Fig 3 shows the ship's vertical displacement that was used in this simulation. Fig 4 shows the cable configuration at $t=100\text{sec}$. Fig 5 shows the time variation of the cable tension just above the electronics package of the muon string. The limit of tension of the wire which was used in experiment is 20 short ton. From the results, we can easily recognize why we lost it.

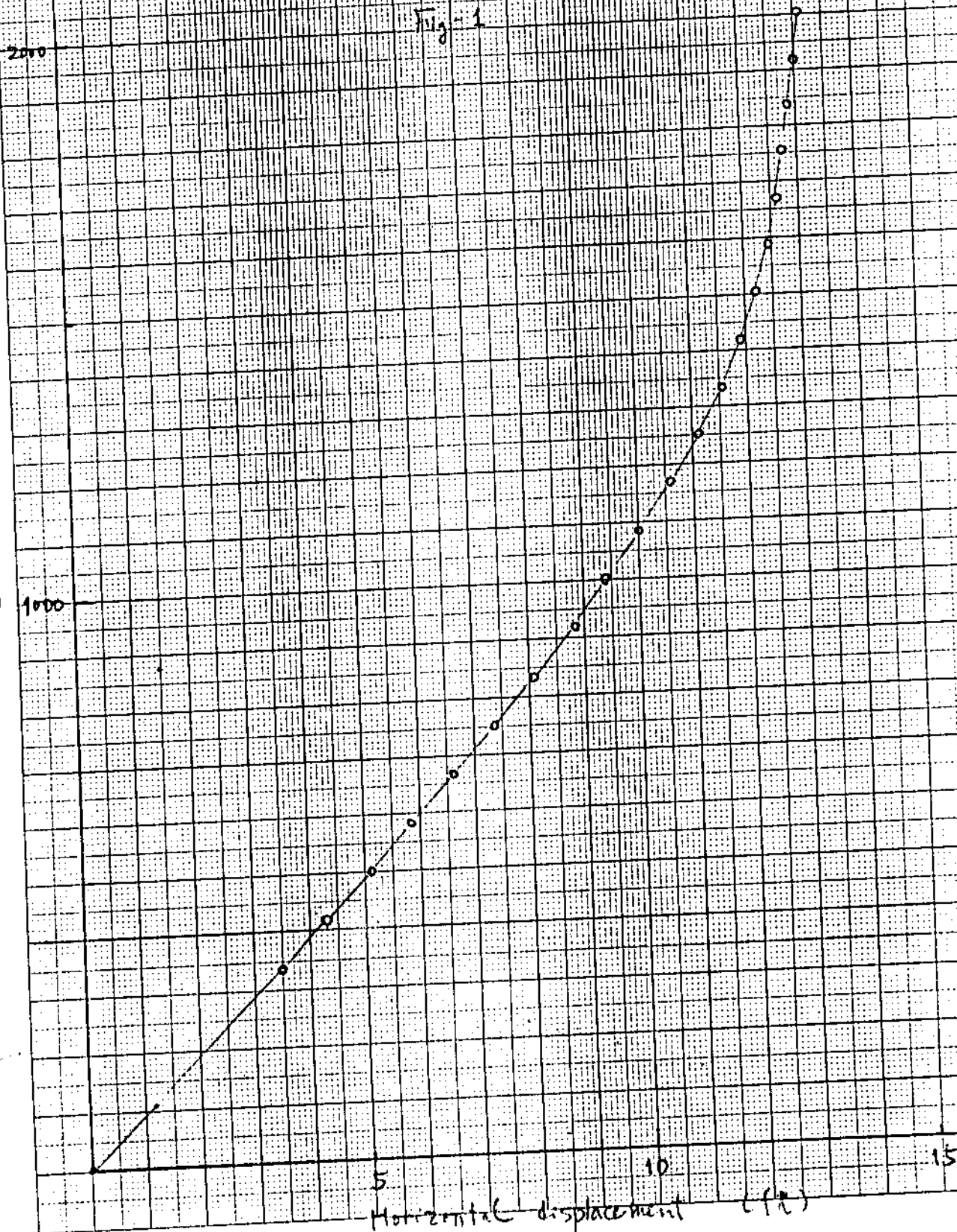
* Reference.

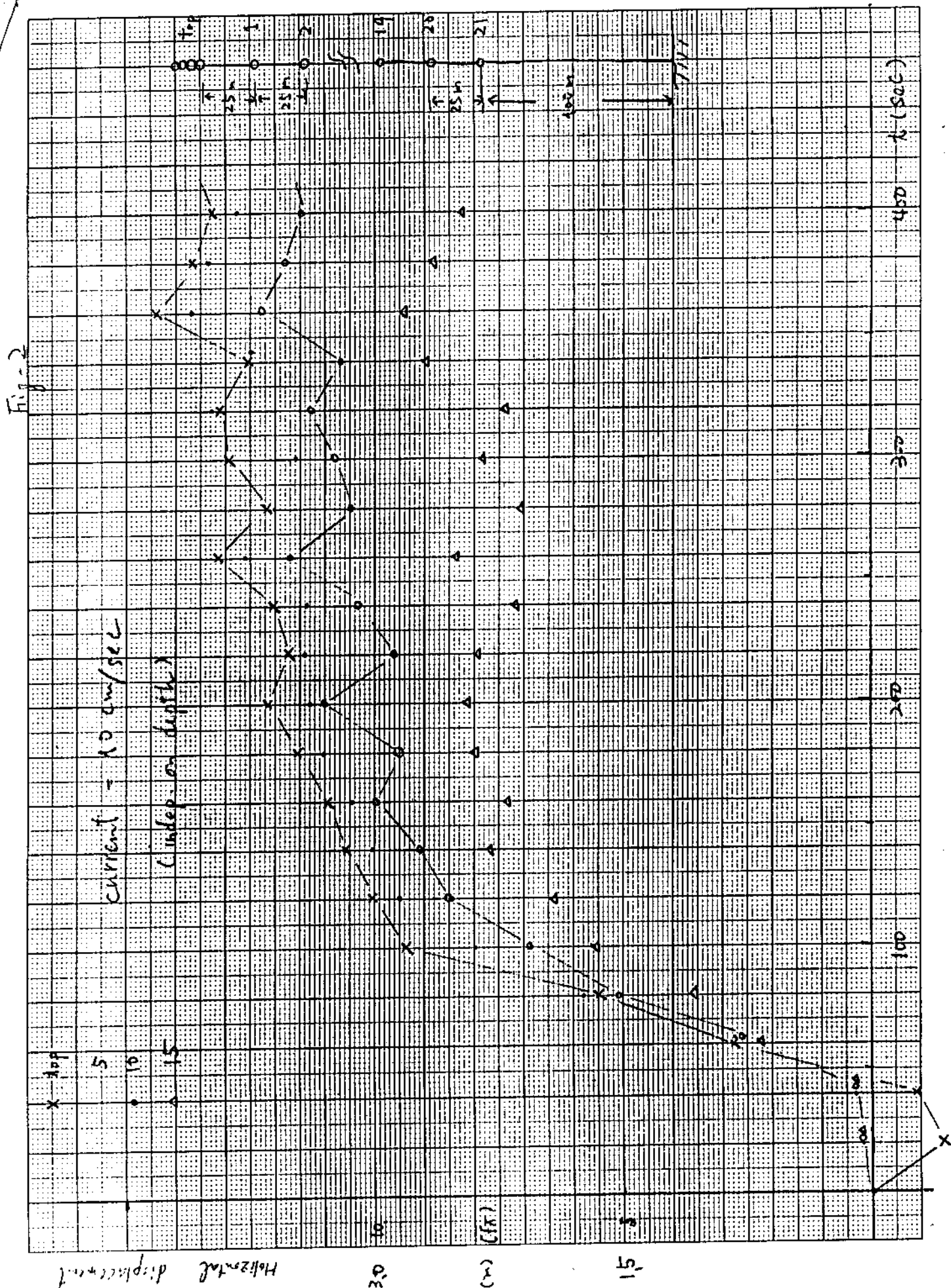
1) F.C.Lin ; SNAPLD user's manual. N-1619, Naval civil engin. lab.
Jan. 1982

461510

K&E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.

vertical height (ft)





RANDOM VERTICAL DISPLACEMENT AT SURFACE

13-APR-83 12:13:48
HUGH STRING SIMULATION DATA. S. H.

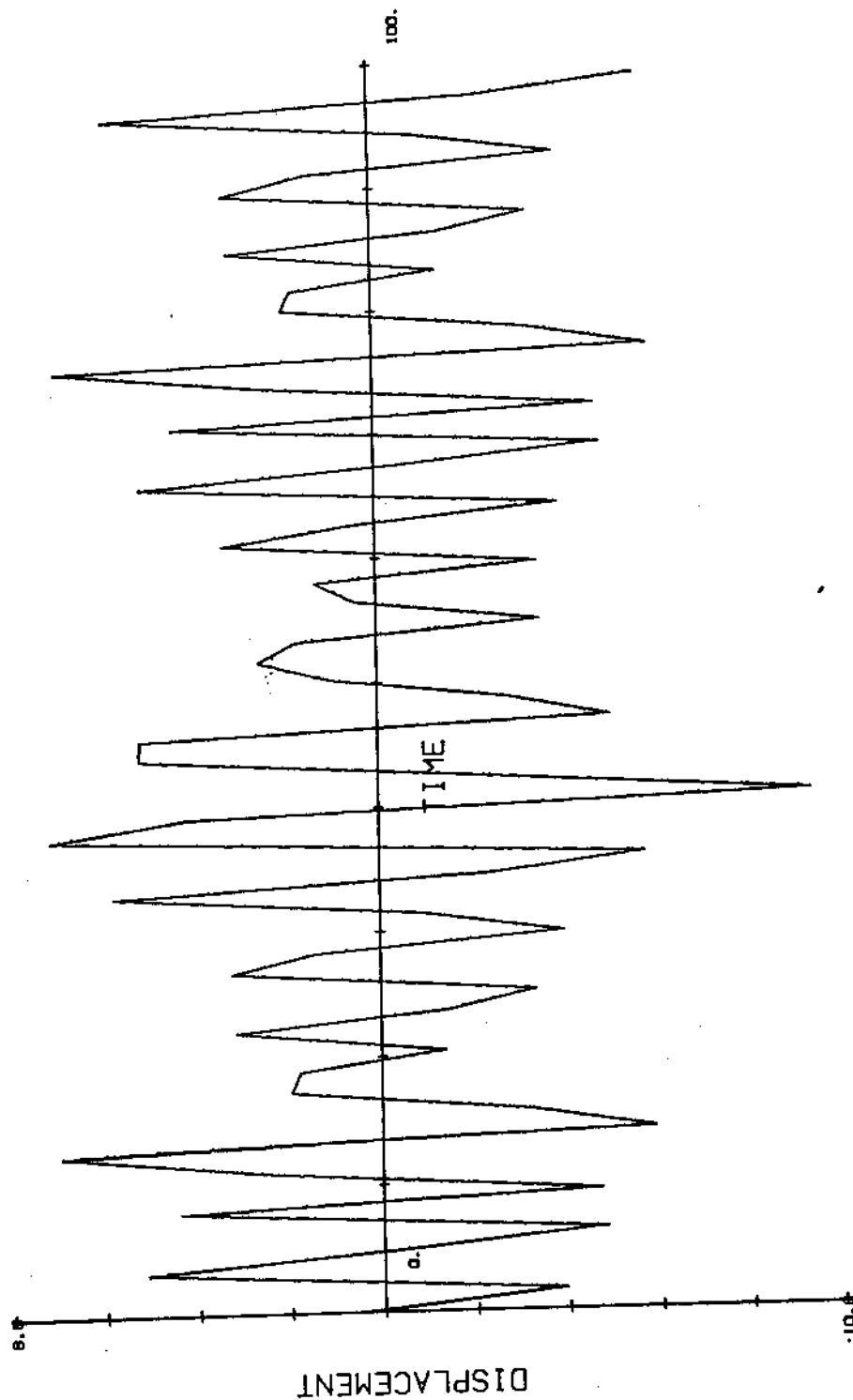


Fig - 3

NØDE POSITION

13-APR-83 12:13:48
HURN STRIKE SIMULATION DATA. 22-MAR-'83 S. H.

TIME (SEC)

100.000

TIME (SEC)

2200.0

2000.0

1800.0

1600.0

1400.0

1200.0

1000.0

800.000

600.000

400.000

200.000

0.000

-200.000

-400.000

-600.000

-800.000

-1000.0

-1200.0

-1400.0

-1600.0

-1800.0

-2000.0

-2200.0

-2400.0

-2600.0

-2800.0

-3000.0

-3200.0

-3400.0

-3600.0

-3800.0

-4000.0

-4200.0

-4400.0

-4600.0

-4800.0

-5000.0

-5200.0

-5400.0

-5600.0

-5800.0

-6000.0

-6200.0

-6400.0

-6600.0

-6800.0

-7000.0

-7200.0

-7400.0

-7600.0

-7800.0

-8000.0

-8200.0

-8400.0

-8600.0

-8800.0

-9000.0

-9200.0

-9400.0

-9600.0

-9800.0

-10000.0

-10200.0

-10400.0

-10600.0

-10800.0

-11000.0

-11200.0

-11400.0

-11600.0

-11800.0

-12000.0

-12200.0

-12400.0

-12600.0

-12800.0

-13000.0

-13200.0

-13400.0

-13600.0

-13800.0

-14000.0

-14200.0

-14400.0

-14600.0

-14800.0

-15000.0

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-15800.0

-16000.0

-16200.0

-16400.0

-16600.0

-16800.0

-17000.0

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-17400.0

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-17800.0

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-18200.0

-18400.0

-18600.0

-18800.0

-19000.0

-19200.0

-19400.0

-19600.0

-19800.0

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-20600.0

-20800.0

-21000.0

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-21600.0

-21800.0

-22000.0

-22200.0

-22400.0

-22600.0

-22800.0

-23000.0

-23200.0

-23400.0

-23600.0

-23800.0

-24000.0

-24200.0

-24400.0

-24600.0

-24800.0

-25000.0

-25200.0

-25400.0

-25600.0

-25800.0

-26000.0

-26200.0

-26400.0

-26600.0

-26800.0

-27000.0

-27200.0

-27400.0

-27600.0

-27800.0

-28000.0

-28200.0

-28400.0

-28600.0

-28800.0

-29000.0

-29200.0

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-29600.0

-29800.0

-30000.0

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-30800.0

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-32600.0

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-33000.0

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-33600.0

-33800.0

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-36400.0

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-38000.0

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-39800.0

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-41400.0

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-41800.0

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-45200.0

-45400.0

-45600.0

-45800.0

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-46200.0

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-46600.0

-46800.0

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-47600.0

-47800.0

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-48200.0

-48400.0

-48600.0

-48800.0

-49000.0

-49200.0

-49400.0

-49600.0

-49800.0

-50000.0

-50200.0

-50400.0

-50600.0

TENSION TIME SERIES

13-APR-83 12:13:48
RUBEN STRING SIMULATION DATA.

LINK 7.
22-MAR-83 S. H.

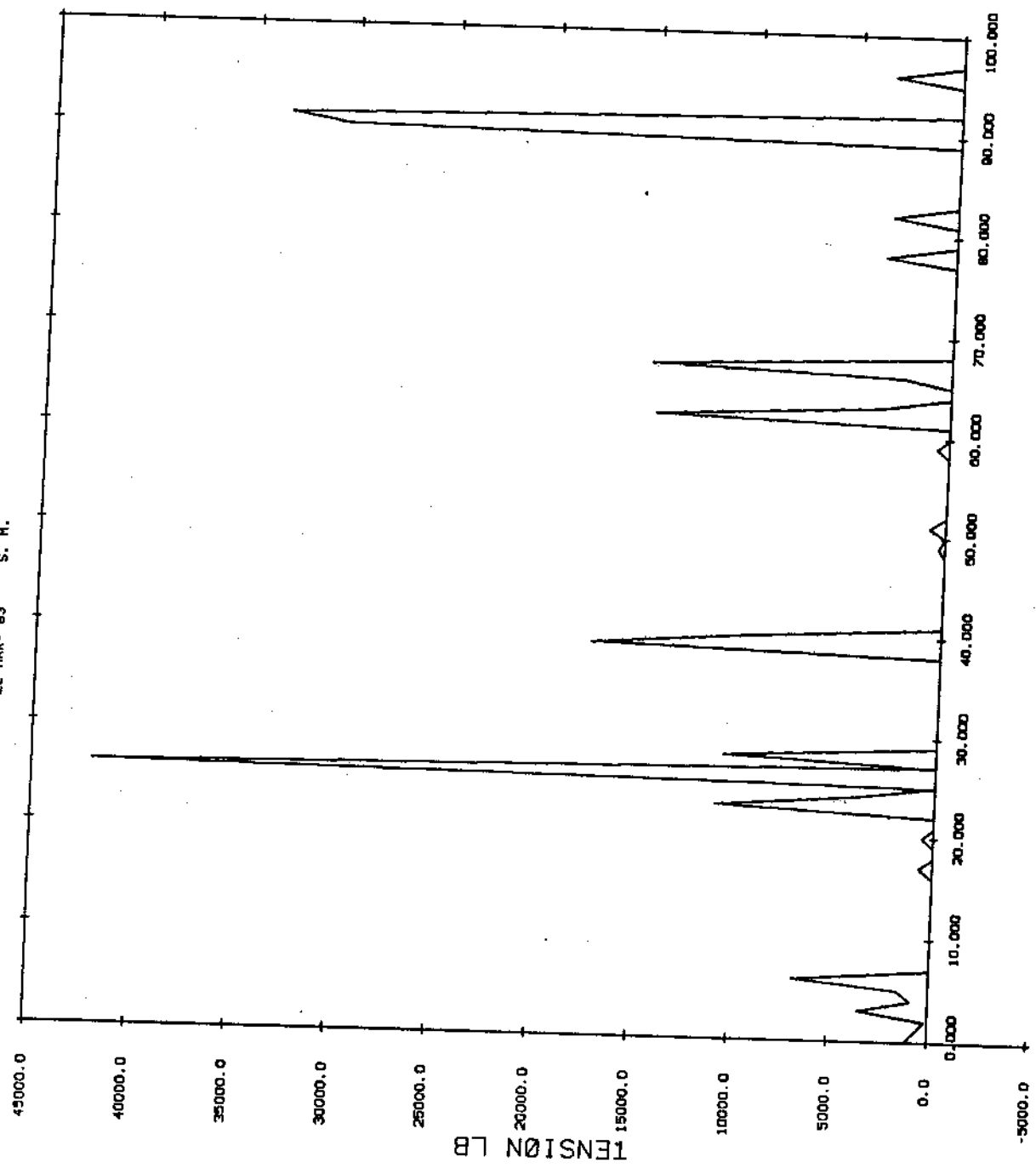


Fig-5