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## Analysis of Waterhammer for Comlicated Pumping Systems

Hiroshi MASE\*

There have been a try-and-error method, graphical method and so forth for waterhammer analysis. But these methods are not practical for complicated pumping plants.

Therefore, using the electronic computer (IBM 7090) with large capacities, the auther established the programs of waterhmmmer for the arbitrary pumping plant with i) friction losses on the conduit, ii) several one-way surge tanks, iii) booster pumps at mid length of the conduit, iv) value losses and so forth. And the establishment of these programs has turned out to be able to compute the waterhammer phenomena economically and rapidly. And applying these programs, the author computed about two pumping plants. The pipe lines are respectively so long that these friction losses take about 50 % of pump head and have several surge-tanks. The computed results were compared with the experimental ones of these plants. These comparisons are shown on the graphs in this paper. And the sufficient coincidence with the experiments and computations could be obtained. Therefore, the programs of waterhammer for the complicated pumping plans are theoretically reasonable and significant from a view of engineering.

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