SELECTED ASPECTS OF

HYDRAULIC ENGINEERING

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TECHNOLOGICAL UNIVERSITY OF DELFT THE NETHERLANDS
DEPARTMENT OF CIVIL ENGINEERING

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It is the art of the engineer to draw sufficient conclusions from insufficient data

LIBER AMICORUM

dedicated to Johannes Theodoor Thijsse, on the occasion of his retirement as professor of Theoretical and Applied Hydraulics at the Technological University Delft

TO THE READER OF THIS BOOK

Johannes Theodoor Thijsse who has been teaching theoretical and experimental hydraulics in the Department of Civil Engineering of the Technological University at Delft for a little over 25 years, will be leaving the University at the end of the current academic year having meanwhile reached the age of 70.

The Department considers it a great privilege to be able to publish this book in honour of its very valued member who has during so many years, rendered it his most excellent services, and who has done so much in the cause of the development of civil engineering and of hydraulics and model-testing in particular, which may also appear from the biography.

For this purpose a Committee was made up on the board of which served among others also the Director of the Hydraulics Laboratory at Delft, a representative of the scientific staff and a representative of the student community. This Committee invited a number of experts from at home and abroad to contribute to a book in the form of an article on one of the many subdivisions of hydraulics and on several other subjects in which Thijsse is keenly interested. Everyone to whom this request was made, reacted in a positive sense and sent in a thorough study within the time fixed. The Committee which also took care of the editing of this book, decided to insert the articles according to the drafts sent in, and only endeavoured to obtain a uniform typography.

The Committee is of the opinion that in this manner it has succeeded in compiling a volume which not only gives a clear view of a selected number of the subjects which are closely connected with Thijsse's work, but that at the same time a work has been achieved by which all those who are interested in hydraulics, may benefit.

The President of the
Department of Civil Engineering of the
Technological University Delft

PROF. IR. A. A. VAN DOUWEN

JOHANNES THEODOOR THIJSSE

In following the path of life a man has made himself, one often perceives besides mental qualities, outward circumstances which have defined the direction and breadth of the path.

Such is the case with Johannes Theodoor Thijsse, born on the 11th of April 1893 in Amsterdam as son of Jac. P. Thijsse, well-known to everyone in Holland, the born pedagogue who taught the Dutch to see and appreciate animated Nature. No wonder similar qualities developed in the son, be it in his own respective direction. To Johannes Theodoor Thijsse especially phenomena related to geography, geophysics and morphology are of very great interest (the honorary membership of the "Koninklijk Nederlands Aardrijkskundig Genootschap", the William Bowie medal of the American Geophysical Union which was awarded to him, and the membership of the "Nederlandse Academie van Wetenschappen" are honourable tokens of this).

And so it is not surprising that, after having graduated in 1918 as civil engineer at the Technological University of Delft, he felt especially attracted to that branch in the field of the civil engineer which is called hydraulic engineering, the studying of the phenomena connected with the eternal play of water and wind, currents and waves, silting and scour.

Then a man crosses his path who guides his steps in a definite direction, H. A. LORENTZ, the famous physicist and Nobel prize winner, then President of the committee named after him, whose task it was to examine the hydraulic effects of a possible closing off of the Zuider Zee.

This problem had for quite some years been occupying many minds. The inducement to set up the committee was the flood-disaster in 1916 which did great damage to the countryside along the Zuider Zee coast. The Lorentz Committee developed practical methods of calculation which made it possible to, in a fairly simple and swift way with the means then available, make predictions concerning tides and storm floods if the geographical situation were to be altered. It was Thijsse, only recently graduated, who was placed on the committee as engineer, and to whom was allotted the task of performing the necessary measurements of current

and tides to keep a check on the calculations. Subsequently he assisted Lorentz as assistant secretary to the committee to work up the calculations for the closing off of the Zuider Zee.
Accordingly it was not surprising that, when in 1919 the Zuider Zee Works were set up to realize the plans for the closing off and partly reclaiming of the Zuider Zee, Thijsse was in 1920 appointed engineer to those Works; and he did, indeed, lead the hydraulic department of it until he was pensioned off on reaching the age of 65, and even now he still lends his valuable assistance as expert to the Zuider Zee Works. Under his enthousiastic and stimulating leadership many a problem in the field of hydrology and hydraulics has been tackled, and science has been greatly enriched in this field with new knowledge and a better insight.
From the beginning, however, it was already clear that many problems could not be solved exactly such as, for example, problems concerning the closing off of outlets, the capacity of sluices, and the strength of silting and scour. Model testing was the only way to find answers even if model testing was still in its infancy with regard to the problems arising in practise. The decision was made to call in the help of the well-known hydraulics' laboratory at Karlsruhe. And it was here that another of those determinant meetings took place, this time with Professor REHBOCK, the famous German hydraulic engineer and director of the laboratory.
This work gripped Thijsse as did the practical possibilities which could be evolved from it. In this he will develop his great power; the practical handling of the many typically Dutch hydraulic problems, not the more abstract theoretical ones, but problems which can be reasonably accurately answered without always having at ones disposal sufficient data. This calls for imagination and courage, but at the same time, it also entails the risk of making mistakes and reaching overhasty conclusions. Thijsse has never avoided this risk, and the way in which he viewed and was critical of his own work, and, where necessary, reviewed former conclusions, does him credit.
Under Thijsse's leadership hydraulic model testing in the Netherlands was started. In 1927 a beginning was made in a modest space in the cellar of the Technological University. The results of the tests inspired so much confidence that more and more orders followed, not only from his own hydraulic department of the Zuider Zee Works, but also from

many other commissioners at home and later on from abroad as well. A separate foundation was created, and in 1933 they moved into the large new laboratory at Delft, later followed by a large open-air laboratory in one of the newly reclaimed polders of the Zuider Zee works. Nowadays hardly any large hydraulic project in Holland is carried out without preliminary model testing.

This large development is, of course, not Thijsse's doing only, but he had the gift of arousing the enthousiasm and of stimulating his co-workers. This work is his greatest hobby, as he himself has been known to say though not without a certain amount of exaggeration.

Those people who are more closely acquainted with him, know that he is interested in many things besides, that he is very fond of music, and has a great love of family life. But he is, in point of fact, at the same time the man who made hydraulic research well-known in Holland and far beyond. And this is what made the board of the Foundation decide, when Thijsse quitted his post as Director of the laboratory in 1960, to call the new hydraulics laboratory which is to be built shortly at Delft, the "Thijsse Laboratory".

Abroad also, his work was widely recognized which is, among other things, apparent from his honorary membership of the International Association for Hydraulic Research which he helped to found.

In what precedes two aspects of Thijsse's career have been broached. There is, however, yet a third aspect in which some thousands of civil-engineers know and appreciate him, and that is as their teacher in the study of hydraulics. In 1936 already, he received a teaching mandate in that subject at the Technological University; in view of the development of hydraulics and the importance of it for the hydraulic engineer, this mandate was before long, changed into an extraordinary and in 1946 into an ordinary professorate.

In this capacity his desire and inherited ability to impart knowledge became clear to everyone. In this he did not confine himself to the training of Dutch engineers. Through his many foreign contacts and trips abroad he earned himself a great name in foreign countries as well. And so it was to him that the request was made to take the initiative in starting an International Course in Hydraulic Engineering at Delft, which was in the first place intended for engineers from developing countries who can put the specific Dutch experience in hydraulics to a

good use. This annual course of which Thijsse was at first Chairman of the Faculty Committee, and to which he is now advisor, happily enjoys great interest. A result of this is his chairmanship of the Netherlands Universities Foundation for International Co-operation. And there are many other activities besides with which Thijsse, owing to his great activity and knowledge and owing to his enthousiasm and drive, was entrusted and still is entrusted, even to such an extent that his friends were often afraid that he was too heavily burdened. It is not surprising that a man like Thijsse who so strongly emphasizes the practical application of hydraulics and who was, in doing so, and still is overwhelmed by the many problems which are put to him, had little time to spare for research, fundamental study or issueing reports. He did, however, greatly stimulate his co-workers to tackle problems on a fundamental base, and not just to be satisfied with incidental results of experiments. He was a pioneer in the field of the transport of materials, and he broke new ground with regard to windwaves and wave-uprush. The importance of the direct influence of wind made him decide on the building of the first windflume in existence for hydraulic research, later on followed by a very large one in the open-air laboratory.

Fate ordained that when he as guest professor in U.S.A., was at last about to get more elbow-room to study, we were on the eve of the flood disaster of 1st February 1953, and this made the Government decide to recall Thijsse to stand by his country in a time of need. This was not the first time his country made an appeal to his knowledge and insight. When, after the Second World War, a battered Holland found itself placed before the enormous task of repairing the damage, there was, in doing so, one hydraulic problem of unprecedented magnitude: the reclaiming of the Island of Walcheren the sea-dikes of which had been bombed away in several places so that the tides had got free play to scour deep gullies in the places which were left unprotected.

In this precarious situation, which called for great haste in making decisions concerning methods to be followed in closing the gaps, Thijsse showed that also in a case such as this, he was capable of with the help of model testing, finding solutions for such completely new techniques.

His great merits have been fully recognized; apart from receiving several high foreign decorations, he was in his own country at an early age already, appointed Officer in the "Orde van Oranje Nassau", and after

the recovery of Walcheren he received a Knighthood in the "Orde van de Nederlandsche Leeuw". He has always been held in especially great esteem by the Royal Family; on several occasions Her Majesty Queen Juliana also brought her important guests into contact with Thijsse and his work, with the man who has the gift of describing his work in such an absorbing and instructive way that it was fascinating even for a layman.

We have been following a fascinating path of life, that of a great man. And now another mile-stone has been reached: the age of 70 which means another farewell, this time to the Technological University as Professor. However, none of his friends doubt the fact, that Thijsse will, in his own characteristic way, continue to make his great knowledge and insight subservient to mankind. It is the wish of his friends that this may afford him and his family with still many years of joy.