

HERON is jointly edited by:
 STEVIN-LABORATORY of the
 department of Civil Engineering,
 Delft University of Technology,
 Delft, The Netherlands
 and
 TNO-INSTITUTE
 FOR BUILDING MATERIALS
 AND STRUCTURES.
 Rijswijk (ZH), The Netherlands.
 HERON contains contributions
 based mainly on research work
 performed in these laboratories
 on strength of materials, structures
 and materials science.

ISSN 0046-7316

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HERON vol. 31
 1986
 no. 1

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 OF PROF. IR. A. L. BOUMA

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Publication in HERON since 1970



prof. ir. A. L. Bouma

Editorial

Prof. A. L. Bouma is retiring as professor of structural mechanics at the Delft University of Technology. He is one of the founders of HERON and has been editor in chief for a considerable number of years (1961–1970). All those who were involved in the publication of HERON have felt his influence as teacher, friend and colleague.

Prof. Bouma started his teaching career first as collaborator and later as successor to Prof. C. G. J. Vreedenburgh, the distinguished teacher of many prominent civil engineers. (Prof. Bouma himself was one of his pupils.) Prof. Vreedenburgh has typified the role of structural mechanics in his day by a lecture on “Experience, intuition and ingenuity” in which he showed how the ideas of brilliant scientists and engineers had contributed to the subject*. He also foresaw that the future would belong to teamwork and collaboration, rather than to the single efforts of the individual.

The legacy to his successor was the task to stimulate such a development. Prof. Bouma came well equipped for the job, having headed a team at TNO-IBBC that worked on analytical methods for the calculation of plates and shells, and on buckling problems.

His transfer to the University coincided with a time of change for calculation methods.

In the initial period, Southwell’s relaxation method and mechanical calculators were used to solve a number of simultaneous equations, which greatly increased the possibilities of solving practical problems with mathematical methods. Up into the sixties, experimental methods and model analysis were often superior as a means of rapidly obtaining numerical solutions to practical problems.

With the arrival of the computer, that soon changed. In particular the finite element method superseded all other numerical approaches and virtually put an end to the use of experimental methods in performing structural analyses. The increasing efficiency of the analytical procedures made it possible to include more and more detail into the mathematical modelling of a structure. Non-linear behaviour, creep, the influence of deformations on structural response etc. were introduced. Much of this also necessitated further deep probing into the real properties of structural materials. Much of this is still going on, for instance within the scope of the “concrete mechanics” programme that is presently being carried out jointly by TNO-IBBC, Delft and Eindhoven Universities of Technology, Rijkswaterstaat and CUR-VB in the Netherlands. Prof. Bouma played a crucial role in bringing together the partners in this co-operative effort.

Meanwhile, another important change of approach occurred in the design of structures. At the time when Prof. Bouma joined the field of structural mechanics, “allow-

* This letter, with the Dutch title “Ervaring, intuïtie en vernuft in mechanica en techniek” was delivered on January 13th 1951 and reprinted in *Heron* 14, 2 (1966).

able stresses” were the link between structural dimensions and the results of the pertinent calculations.

Especially for predominantly statically loaded structures – as most civil engineering structures are – it became obvious that some of them possessed enormous reserves of strength beyond the first local attainment of yield in the material. Limit design, and later more sophisticated methods of plastic analysis were the result. Since the sixties, the codes of practice for the design of concrete and steel structures have been based to a large extent on the analysis of the ultimate load carrying capacity.

In addition, even if the ultimate load capacity is known, it is no simple matter to determine the necessary safety margin. A rational approach emerged slowly through international co-operation. For this, the stochastic properties of the loads and of the structural material are taken into account in order to ensure a sufficiently small probability of failure. Especially in relation to the safety of off-shore structures, Prof. Bouma contributed to this work as chairman of a committee on marine technological research (MaTS).

On a period of tremendous change in the field of structural mechanics, a broad outlook, flexibility of approach and the ability to apply many new ideas become prerequisites for an academic. But at the same time, a critical approach and the capacity to convey not only knowledge but also enthusiasm and the spirit of enquiry is also required. Prof. Bouma has achieved this task very successfully. He has educated many pupils who have become prominent members of the civil engineering profession and who received the impulse to devote themselves to the advancement of the methods of structural mechanics from him. The greater part of the publications in HERON since about 1970 has been produced by his pupils or his close colleagues. The high level of attainment in the study of structural mechanics among civil engineers in our country has much to do with his activities in the span of almost 40 years.

This number of HERON is devoted to honour Prof. Bouma on his retirement. The papers written by some of his pupils and close colleagues can only give a limited example of the wide range of activities of those who were influenced by Prof. Bouma in their choice of a career in structural mechanics.

Nevertheless, as past and present editor in chief of HERON we hope that some of our appreciation for the contribution of Prof. Bouma to the study of the strength of materials and related subjects will be conveyed to our readers.

F. K. Ligtenberg
past editor in chief

J. Witteveen
present editor in chief