

**Introduction to the Proceedings of the
International Colloquium on 'Mécanique de la Turbulence'
held at IMST in Marseille from August 28th to September 2nd 1961**

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The Mechanics of Turbulence has developed because of the importance of the scientific problems raised by the phenomenon of turbulence in Fluid Mechanics, and in other sciences such as Geophysics, Astrophysics, Magnetohydrodynamics, Thermodynamics and Acoustics. Statistical methods have been developed to treat these problems, and the Mechanics of Turbulence can now be considered as a new science.

In recent decades, a great number of theories have been elaborated, and a great number of experiments have been carried out, concerning turbulence. Some of the published ideas and theories are widely accepted, others are contested, and yet others are insufficiently understood because they are too complex; finally, some are neglected simply because they are old. As far as experimental results are concerned, their interpretation is sometimes still incomplete, and they are not fully utilized.

It seemed therefore timely to organize a Colloquium on the Mechanics of Turbulence, focusing specifically on the examination and clarification of published concepts and theories as well as on known experimental results.

This International Colloquium of the National Centre for Scientific Research (CNRS) was held on the occasion of the inauguration of the Institute for the Statistical Mechanics of Turbulence of the Science Department at Aix-Marseille University.

The Scientific Committee had defined the goal of the Colloquium -- a critical examination of works published on the study of turbulence-- and had determined the method that was to be adopted. It resolved that such an undertaking required that a strictly limited number of highly qualified participants be invited, and that the work be organized on the basis of active cooperation.

As a matter of principle, it was intended that contributions of ongoing work should not to be included in the program, unless these contributions could clarify or extend the fundamental ideas under discussion.

The major part of the time available during the meeting was to be dedicated to a clear and thorough description of the various published theories and experiments, regardless of their age, and focusing attention on fundamental and general ideas.

One year prior to the meeting in Marseille, seven Sessions were planned, defining the chosen branches of the field. However, a final Session was also to be

concerned with topics relevant to several of these branches, or on the contrary to none.

The session Presidents soon began their preparations. They chose the topics to be treated, and the Speakers who were asked to present them. They coordinated the subsequent work, triggered and conducted the discussions, and finally summarized the overall views related to their sessions.

The Speakers, with the collaboration of the Participants, gathered, analyzed and criticized the documentation, and wrote the Reports to be published in the Proceedings.

The Participants were also invited to send to the session Presidents their suggestions concerning questions to be included in the program, and a statement of the main contributions they were planning to make during the sessions.

During the months preceding the Colloquium, several groups of Participants met regularly at conferences to prepare presentations and discussions.

The summaries of most of the presentations were disseminated two months before the Conference.

During the Colloquium meeting in Marseille, the Speakers presented the various topics, limiting their presentations to the fundamental and general ideas concerning the mechanism and the structure of turbulence. Many of these presentations led to in-depth and constructive discussions, thus fulfilling the main goal of the meeting.

The final Session was dedicated to the presentation by the session Presidents of summaries concerning their Sessions.

This book thus contains texts which offer a general view on the work that was achieved under the following titles:

Comments on the section : Diffusion and Lagrangian viewpoint.

The Dynamics of Homogeneous Turbulence : Introductory Remarks.

Comments on the section : Stationary fully developed turbulence.

Comments on the section : Free turbulence.

Comments on the section : Turbulent boundary layers.

*Comments on the section : Turbulence in compressible and
electrically conducting media.*

Comments on the section : New concepts and recent contributions.

The presentations made by the Speakers, and the accounts of the ensuing discussions, are also recorded in these Proceedings. Because of the specific goal of this Conference, the Authors of these Reports and presentations were allowed to revise their texts after the Colloquium, so that the book provided to researchers may benefit from the work that was accomplished.

The Honorary Presidents and the President provided their support, advice and participation to the organization and tasks of the Colloquium.

The Members of the Scientific Committee also provided the backing of their authority, and their valued advice.

The Foreign Members of the Executive Scientific Committee played a constant and essential role in the organization.

A very important, time-consuming, and difficult task was accomplished by the Session Presidents, who carried the responsibility for the scientific work of the sessions.

The Speakers accepted the considerable burden of essential scientific work which was asked from them for the benefit of all.

The work of the scientific Secretaries in preparing the valuable summaries of the discussions is gratefully acknowledged.

Finally, all the eminent scholars who agreed to participate in the preparation and work of the Colloquium ensured the outstanding quality of this scientific conference and, despite the difficulty of its subject, great progress within a climate of international cooperation and friendship.

We extend our thanks to all of them.

Alexandre Favre