FROM THE EDITORS

The idea of the TASK Quarterly issues dedicated to selected branches of sciences is aimed at presentation of the research carried out in TASK in a broader perspective. It is meant to show the research carried out in TASK in relation to the state of science in Poland and also in the World.

This issue is focused on Computational Fluid Dynamics (CFD). The motion of fluid is believed to be well described by equations of conservation where the conservation of momentum is described by the Navier-Stokes equation. This set of equations has to be closed by additional constitutive equations, describing the medium itself and its physical behaviour. Such a description of the flow contains all the details including turbulent motion. The phenomenon of turbulence involves different scales of flow structure including microscales. If such general description of fluid flow is to be used in numerical simulations it is essential to discretise the space in such a way that it is possible to resolve the microstructures of turbulent motion. This also puts very high restrictions on the time step. Such an approach, called Direct Numerical Simulation (DNS) puts very high demand on computer resources, hardly accessible at present time if even a simple applicable flow case is to be considered. DNS is used now only for the simplest flow configurations and very small volume of space. This method may not be used for any technical applications due to the lack of sufficient computer power.

This reasons cause that the CFD is one of science domains awaiting fast development of a computer performance and making use of any development in this respect.

The above described difficulty causes that the applicable spatial resolution used is very course in respect to microstructure of turbulence. The effective contribution of turbulence to the flow behaviour is taken into account by its physical modelling. For this purpose the Navier-Stokes equations are rewritten in the form proposed by Reynolds which treats the flow as a mean flow with superimposed turbulent motion. This turbulence is described by a number of models. Until now there is no consistent approach to turbulence. There are a lot of attempts to model the turbulence and they are often successful but to a very restricted flow types or even flow cases.

Fluid Dynamics is one of the fields of sciences which has experienced an enormous acceleration in its development due to the progress in computer abilities. However CFD at present is still limited by the computer resources.

Fluid Mechanics in Poland has gathered a large group of scientists of worldwide reputation. Polish Academy of Sciences has formed societies of researchers concerned with different fields of sciences. A Section of Fluid Mechanics has been also created which is at present chaired by Prof. T. Chmielniak. This issue of TASK Quarterly has been prepared in collaboration with this society. Between the authors there are heads of some subsections:

- subsection on CFD, *Prof. Z. Kazimierski*
- subsection on Internal Flows, *Prof. P. Doerffer*
- subsection on Ships Hydromechanics, *Prof. J. Szantyr*

The paper of Prof. Kazimierski gives only a brief survey through the research centres dealing with CFD. It is considered as valuable to continue the idea of TASK issues devoted to CFD. The next CFD issue is planned exactly in one year time, that is the second quarter of 1999.

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Gdansk, 01.04.98