流体力学在取得巨大进展的同时，也留下了一些仍待解决的问题。不尽快地将它们解决，必然对科学及工程技术的进一步发展带来困难。同时，技术的发展是无止境的。仅就交通运输为例，无论是空中、水上水下，还是陆地上的交通工具都在朝着更大、更快、更安全、更舒适的方向发展，新问题将层出不穷。

As the fluid mechanics achieves huge progress, some problems are also left unsolved. Any delay in solving them will inevitably bring difficulty to the further development of science and engineering technology. Meanwhile, the development of technology is infinite. Just taking transportation for example, no matter in air, above water or under water, and on land, transportation vehicles are developing towards the direction of being larger, faster, safer and more comfortable, and new problems keep surfacing.

第一个大问题是湍流。经过几代人的努力，对这一问题的认识已大为深化，这才有上述各项成就。绝大多数情况下，流体运动都处于湍流状态。目前计算这类问题的方法都带有经验的成分，因此计算结果不十分有把握，各种办法的普适性和预测能力均差，特别是对于超声速、高超声速流中的湍流，情况尤其如此。随着高新技术的发展，发现过去的经验局限性太大，因而亟待在湍流的研究上有所突破。The first major problem is turbulent flow. With efforts of several generations, cognition concerning this problem has been largely deepened, which leads to the achievements mentioned above. In most circumstances, fluid motion is in turbulent state. At present, methods to calculate such problems are partly based on experience, thus the computation result is not that reliable, and the universality as well ability in forecast of various methods are in poor condition, which is especially the case for turbulence in supersonic velocity and hypersonic velocity flow. With the development of high-technology, it seemed that the past experience has its limitation, so the breakthrough of the research in turbulent flow is urgently expected.

由于复杂流场计算的需要，各种计算方法和理论还需大大发展，以期能精确捕捉激波和分辨漩涡运动、能够处理非线性自由表面及湍流问题等。由于计算量特别巨大，必须发展新的计算机硬件和软件，特别是并行机及其软件，并行计算软件的发展，也必须结合具体计算对象来研制。因而计算流体力学的发展，既是解决具体问题所需，也将对计算科学做出重要贡献。Thanks to the demand of complicated flow field computation, diversified computation methods and theories need great improvement in order to capture the shock wave and distinguish eddy motion precisely as well as to deal with nonlinear free surface and turbulence issues. Considering the large quantity of computation, new computer hardware and software must be developed, especially parallel machine and it software, and the development of parallel computation software must be researched by combining specific computation object. Therefore, the development of fluid mechanics not only solves specific problems but also makes great contribution to computation science.