<<表面活性剂湍流减阻>>

图书基本信息

书名：<<表面活性剂湍流减阻>>

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作者：杨凤臣

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内容概要

表面活性剂湍流减阻是流体动力学领域多年来的研究热点，这一现象同时与湍流、流变学、流体动力学等多个方面密切相关，而且对其进行应用推广需要化工、机械、市政等不同领域知识的有机结合。
《表面活性剂湍流减阻（英文版）》正是在这一背景下，基于表面活性剂湍流减阻流动研究领域最新的实验、数值模拟和理论分析方面的研究成果，详细阐述有关表面活性剂湍流减阻流动的湍流特性、流变学物性、理论、特殊技术以及实际应用方面的问题。

《表面活性剂湍流减阻（英文版）》可供流体力学、工程热物理、化学工程、空调、制冷等相关专业研究生以及相关研究领域的科研人员参考使用。

书籍目录

章节摘录

版权页： 插图： 1.3.2.4 Decoupling of Turbulent Fluctuations It has been indicated from many studies that the effect of drag reducer on turbulent flows also appears as the decreased correlation between the axial and radial fluctua-tions. This effect is named "decoupling." The decoupling of turbulent fluctuations can decrease the Reynolds stress. According to the quantitative relationship between Reynolds shear stress and the turbulent contribution to frictional drag coefficient deduced by Fukagata et al. （i.e., the FIK equation） （38）, a decrease of Reynolds shear stress directly results in a decrease of the friction factor of turbulent flow, and so turbulent DR. Actually, a decrease of Reynolds stress is caused by twofold effects, that is, the decoupling of turbulent fluctuations and turbulence suppression （17,33,39-41 ）.This postulation is also correct qualitatively. 1.3.2.5 Viscoelasticity All polymer and surfactant solutions with turbulent drag-reducing effects display viscoelastic rheological properties. With the development of viscoelastic fluid mechanics, some researchers proposed that the drag-reducing effect of polymer and surfactant solutions is the result of the interaction between viscoelasticity and turbulent vortices. The microstructures （polymer molecule chains or network structures in surfactant solution） in the drag reducer solution at a high-shear-rate region can absorb the turbulent kinetic energy of small vortices within the energy-containing range and store it. When the microstructures are diffused or convected to a low-shear-rate region,they will be relaxed to a random threadlike entanglement and the stored energy will be released to the low-wave-number vortices （large-scaled vortices） in the form of elastic stress waves, which greatly decreases the dissipation of turbulent kinetic energy and induces turbulent DR. The viscoelastic theory for the mechanism of turbulent DR by additives was proposed by DeGennes （42）. The viscoelasticity postulation not only explains the turbulent DR phenomenon in many polymer and surfactant solution flows with viscoelasticity, but also estimates the DR rate quantitatively. It is also a powerful tool for studying the mechanism of turbulent DR from the viewpoint of the physics of turbulence and developing new quantitative analysis theories for turbulent drag-reducing flows. However, this postulation was challenged by the "anisotropic stresses"hypothesis proposed by Toonder （43）.

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