Preface

This report contains the 1993 annual progress reports of the Research Fellows and students of the Center for Turbulence Research. In addition to this and the Summer Program reports, each year several CTR manuscript reports are published to expedite the dissemination of research findings by the CTR Fellows.

The Fellows of the Center for Turbulence Research are engaged in fundamental studies of turbulent flows with the objective of advancing the physical understanding of turbulence and to improve turbulence models for engineering analysis and develop techniques for turbulence control. The CTR Fellows have a broad range of interests and expertise; together with the NASA-Ames scientific staff and Stanford faculty members, they form a stimulating environment devoted to the study of turbulence.

In its seventh year of operation, CTR hosted seventeen resident Postdoctoral Fellows, four Research Associates, and four Senior Research Fellows, and it supported three doctoral students and six short term visitors. The major portion of Stanford's doctoral program in turbulence is sponsored by the United States Air Force Office of Scientific Research and the Office of Naval Research. Many students supported by these programs also conduct their research at the CTR. This report includes work only for those students who are directly supported by the CTR.

The first group of reports in this volume are directed towards the theory and application of active control in turbulent flows. A notable progress in this area was the development of a systematic mathematical procedure based on the Navier Stokes equations for flow control. The second and the largest group of reports are concerned with the prediction of turbulent flows. Last year a significant fraction of CTR's effort in large eddy simulation and Reynolds averaged turbulence modeling was focused on the *application* of models developed at the CTR to complex flows. We expect this trend to continue. The remaining articles are devoted to turbulent reacting flows, turbulence physics, experiments, and simulations. In particular, a new set of experiments addressing the question of local isotropy in high Reynolds number strained turbulence was conducted in the 80x120 tunnel at Ames. It is becoming evident that this and perhaps other similar large scale national facilities can effectively be used for fundamental flow research. In the last two years, colleagues from other universities were also able to participate in these unique experiments.

The CTR roster for 1993 is provided in the Appendix. Also listed are the members of the Advisory Committee which meets annually to review the Center's program and the Steering Committee which acts on Fellowship applications.

It is a pleasure to thank Debra Spinks, the Center's Administrative Assistant, for her skillful compilation of this report.

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