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**Dynamics and Statistics of Concentrated Vortices
in Turbulent Flow**

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Preface

This special issue of the journal contains a representative selection of papers presented at Euromech Colloquium 364 'Dynamics and Statistics of Concentrated Vortices in Turbulent Flow', held at Carry-le-Rouet (near Marseilles) 24–27 June 1997. The fresh air and relaxed atmosphere of this Mediterranean resort were conducive to a lively exchange of views on a subject that has attracted growing interest in analytical, numerical and experimental work on turbulent flow over the last decade.

Direct numerical simulations (DNS) of turbulence at modest Reynolds numbers reveal the presence and persistence of concentrated vortices distributed randomly and intermittently throughout the flow field. The genesis of these vortices remains somewhat obscure, although it is clear that, once formed, they can be maintained by the stretching action associated with the background flow (itself a product of background, or more remote, vorticity). At first approximation, these stretched vortices are like 'Burgers vortices', familiar to every student of elementary fluid mechanics; but this is only a first approximation because the strain field to which each vortex is subject is in general non-axisymmetric, non-uniform and unsteady—all properties which potentially mitigate against the survival of the Burgers vortex. The amazing thing is that, even in these unpropitious circumstances, the vortices are so clearly evident both in DNS and in experiments.

This collection of papers provides an excellent introduction to a range of challenging problems associated with such concentrated vortices, and will contribute significantly to the continuing debate concerning the role that these play in relation to the intermittency, the diffusive properties, and indeed the fundamental dynamics of turbulent flow.

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