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THREE DIMENSIONAL VORTEX METHODS AND THEIR APPLICATION
TO THE DIRECT SIMULATION OF TURBULENCE

by

S.P. BALLARD

Met O 11 (Forecasting Research
Branch)

Meteorological Office
London Road
Bracknell
Berkshire
England.

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ABSTRACT

The three dimensional vortex methods of Chorin and Beale and Majda are compared for simple initial data and the similarity of the methods is illustrated. Tests performed using Chorin's method show that the solution is only weakly dependent on most of the adjustable parameters. However there is a strong dependence on the form of the smoothing function required for the velocity integral. The solutions illustrate the rapid stretching of vorticity in inviscid flow but cannot prove conclusively the presence of a singularity in finite time. An important result of this study is that pairing of opposite signed vorticity may be responsible for a significant part of the increase in vorticity and may be a useful concept when parametrizing the effects of viscosity.

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