Abstract Submitted for the DFD06 Meeting of The American Physical Society

Quantifying anisotropy in stratified and rotating turbulent flows<sup>1</sup> LUKAS LIECHTENSTEIN, KAI SCHNEIDER, MSNM-CNRS & CMI, Université de Provence, Marseille, France, FABIEN GODEFERD, LMFA-CNRS, Ecole Centrale de Lyon, France, MARIE FARGE, Ecole Normale Superieure, Paris, France, CLAUDE CAMBON, LMFA-CNRS, Ecole Centrale de Lvon, France — We study freely decaying homogeneous anisotropic turbulent flows, submitted to either rotation or stratification, similar to those encountered in geophysical flows. We solve the three-dimensional Navier-Stokes equations with Boussinesq hypothesis by direct numerical simulation, using a pseudo-spectral method at resolution  $512^3$ . We propose new diagnostics to characterize and quantify the anisotropy of these flows, which are based on three-dimensional orthogonal vector-valued wavelet decomposition. We thus show the energy distribution in terms of both scale and direction for each component of the velocity vector and quantify the flow anisotropy. We also apply the coherent vortex extraction algorithm, based on the nonlinear filtering of the wavelet coefficients of the vorticity field, to different anisotropic flows, yielding a strong data compression.

<sup>1</sup>We acknowledge financial support from ANR, France.

Marie Farge Ecole Normale Superieure, Paris, France

Date submitted: 05 Aug 2006

Electronic form version 1.4