

Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Sorting Category: 01. (T)

On the Lamb vector divergence as a momentum field diagnostic employed in turbulent channel flow¹ CURTIS W. HAMMAN, ROBERT M. KIRBY, University of Utah, JOSEPH C. KLEWICKI, University of New Hampshire — Vorticity, enstrophy, helicity, and other derived field variables provide invaluable information about the kinematics and dynamics of fluids. However, whether or not derived field variables exist that intrinsically identify spatially localized motions having a distinct capacity to affect a time rate of change of linear momentum is seldom addressed in the literature. The purpose of the present study is to illustrate the unique attributes of the divergence of the Lamb vector in order to qualify its potential for characterizing such spatially localized motions. Toward this aim, we describe the mathematical properties, near-wall behavior, and scaling characteristics of the divergence of the Lamb vector for turbulent channel flow. When scaled by inner variables, the mean divergence of the Lamb vector merges to a single curve in the inner layer, and the fluctuating quantities exhibit a strong correlation with the Bernoulli function throughout much of the inner layer.

¹This work is partially supported by NSF grant no. CTS-0555223 (M. Plesniak, grant monitor).

Prefer Oral Session
 Prefer Poster Session

Curtis W. Hamman
Curtis.Hamman@utah.edu
University of Utah

Date submitted: 04 Aug 2006

Electronic form version 1.4