A Web-Services accessible database for channel flow turbulence at
Re_τ**=1000**[1] J. GRAHAM, K. KANOV, E. GIVELBERG, R. BURNS, G. EYINK,
A. SZALAY, C. MENEVEAU, Johns Hopkins University, M.K. LEE, N. MALAYA,
R.D. MOSER, University of Texas — In this presentation we describe a new public
database archiving a DNS data set of the space-time evolution of fully developed
channel flow at $Re_\tau = 1000$. The database will contain data from a DNS of channel
flow with domain-size of $8\pi \times 2 \times 3\pi$, at the resolution of 2048×512×1536, with 2048
time-frames of velocity and pressure fields spanning about a flow-through time scale.
After simulation, the data are ingested into the database cluster using a space-filling
Morton-curve to index the computational space uniformly, and also to organize data
partition and distribution. The database system allows users access and to process
the data remotely through an interface based on the Web-Service model. Users are
thus able to perform numerical experiments on the high-resolution DNS data using
least capable desktop computers. Test calculations are performed to illustrate the
usage of the system and to verify the correctness of the data. Construction of the
database also involves developments of MPI-DB, a new tool to facilitate coupling of
parallel simulations and databases.

Charles Meneveau
Johns Hopkins University

Date submitted: 02 Aug 2013   Electronic form version 1.4