Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

A second-order consistent time-resolved database of turbulent channel flow up to $Re_\tau \approx 5000$[1] ALBERTO VELA-MARTIN, MIGUEL P. ENCINAR, JAVIER JIMENEZ, Universidad Politécnica de Madrid — Wall-bounded flows play an important role in numerous common applications, and have been intensively studied for over a century. Understanding the fundamental mechanisms of the logarithmic and outer regions is essential for the development of effective control strategies and for the construction of a complete theory of wall-bounded flows. A proper analysis of the logarithmic and the outer layers requires time-resolved simulations at high Reynolds numbers in large domains, which makes the storage of the time series impractical. We present a novel low-storage method for time-resolved simulations. By retaining only the large and intermediate scales, while taking care to keep all the variables needed to fully reconstruct the flow at the level of second-order statistics, we reduce the storage requirements by a factor of 10^3. This new methodology is efficiently implemented by using a new high-resolution hybrid CUDA-MPI code, which exploits the advantages of GPU co-processors on distributed memory systems, and allows to run for physically meaningful times. Databases for channel flows at up to $Re_\tau = 5300$ in large boxes ($8\pi h \times 3\pi h$) for over 30 turnover times, are presented.

[1]Funded by the ERC COTURB project. Part of the computational time was provided by the PRACE TIER-0 project "TREC".

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Date submitted: 31 Jul 2019 Electronic form version 1.4