

Structures and Statistics: Understanding Turbulent Transport Using Petascale Resources

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Based on the assumption that direct numerical solution of the Navier-Stokes equations on unprecedentedly fine grids will be possible using these platforms, this talk will focus on analysis of such solutions in the context of turbulent transport. Data decimation will be essential to knowledge extraction, and run time identification and characterization of turbulent structures promises one path to significant new insights. The sheer size of the anticipated petascale data volumes will make data movement impossible and local process analysis difficult. On the other hand, the problem sizes achievable will allow meaningful statistical analysis to extend beyond point-wise and spectral measures to the properties of turbulent structures. Output in form of structure characterization, in lieu of gridded field values, may thus provide a scientifically compelling means by which to reduce petascale data volumes.