

NCCS Snapshot December 4, 2006

NATIONAL CENTER
FOR COMPUTATIONAL SCIENCES



Oak Ridge National Laboratory
U.S. Department of Energy

Combustion Researchers Resolve Turbulence Issue

Project

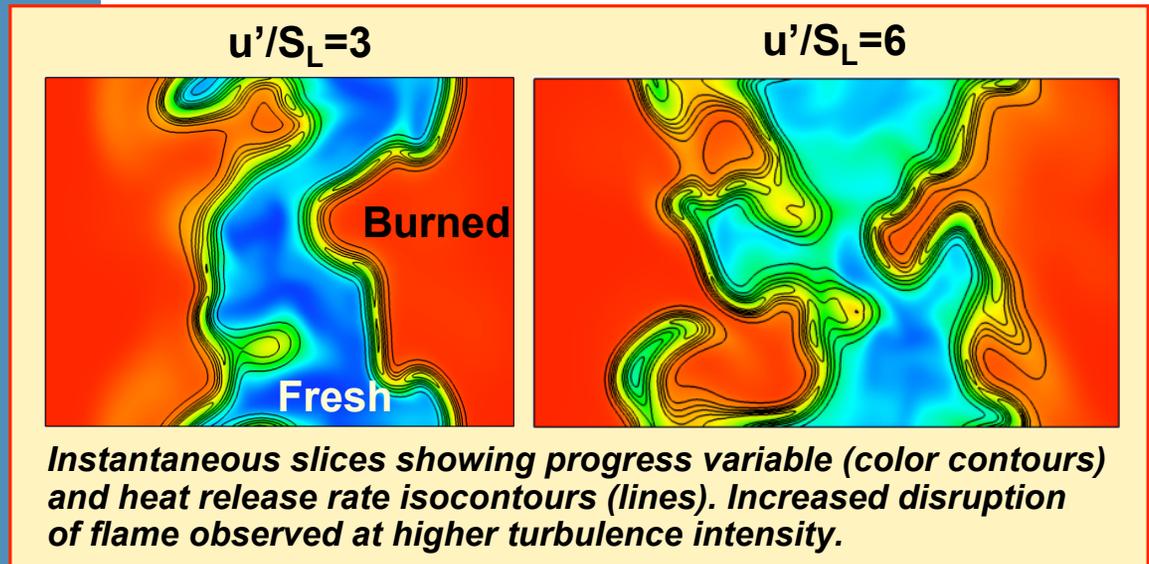
- ▶ High-Fidelity Numerical Simulations of Turbulent Combustion—Fundamental Science Towards Predictive Models
- ▶ Jacqueline Chen, principal investigator

Results

- ▶ Intense turbulence causes lean, premixed flame to thicken

Implications

- ▶ Resolves issue: Experimental results were contradictory
- ▶ Greater efficiency of gas turbine power generators
 - Lower-temperature flame
 - Reduced NO_x emissions



Use of NCCS resources

- Simulations fully resolve all turbulence and flame scales without use of models
- Three simulations on Jaguar, the largest using
 - 200 million grid points
 - 7–10 days
 - 7,200 cores
- Over last year, project generated 30 TB of data

Acceptance Testing Begins on Cray XT4

All 68 cabinets of the new Cray XT4 have arrived at the NCCS and installation has been completed.

Acceptance testing:

- System stabilization
- Hardware evaluation
- Operating system testing
- Analysis of batch scheduling system
- Code evaluation



The Cray XT3 and XT4 will be combined in early 2007, resulting in a supercomputer capable of more than 100 teraflops.