CREATE, PART 2

7 Guest Editors’ Introduction
Douglass Post, Kevin Newmeyer, Sandra Landsberg, Forrest Shull, and Scott Sundt

10 Navy Enhanced Sierra Mechanics (NESM): Toolbox for Predicting Navy Shock and Damage
E. Thomas Moyer, Jonathan C. Stergiou, Garth M. Reese, and Najib N. Abboud
The US Navy is developing a new suite of computational mechanics tools to predict ship response and damage during threat weapon encounters. Navy Enhanced Sierra Mechanics is optimized to support high-performance computing architectures, providing the physics-based ship response and threat weapon damage predictions needed to support the design and assessment of highly survivable ships.

19 First-Principles Physics-Based Rotorcraft Flowfield Simulation Using HPCMP CREATE-AV Helios
Nathan Hariharan, Andrew Wissink, Mark Potsdam, and Roger Strawn
The flowfield around a helicopter’s spinning rotor is difficult to model due to its unsteadiness and strong vorticity. The underlying issue in modeling rotorcraft flowfields is the necessity to correctly account for the complex vortex wake produced by the rotor.

27 Development and Application of an Incompressible Strand Solver
Keegan Delaney, Joseph Gorski, and Aaron Katz
Most current high-fidelity computational fluid dynamics methods used by the US Navy require body-fitted volume grids that depend on seasoned engineers with significant grid generation experience. Automated grid generation using a strand gridding approach is a relatively new concept that could transform the role of higher fidelity CFD within the Navy’s design and analysis process.

35 Risk-Based Software Development Practices for CREATE Multiphysics HPC Software Applications
Richard P. Kendall, Lawrence G. Votta, Douglass E. Post, Chris A. Atwood, Nathan Hariharan, Scott A. Morton, Michael S. Gilbert, E. Thomas Moyer, Robert P. McNally, and Anthony J. Wilson
The CREATE experience provides a concrete example of the successful implementation of best software engineering practices in a computational science and engineering milieu that has historically questioned the value of traditional software engineering wisdom and has resisted the adoption of plan-centered software engineering processes.

47 HPCMP CREATE-SH Integrated Hydrodynamic Design Environment
Wesley Wilson, Tony Quezon, Vu Trinh, Cullen Sarles, Jun Li, and Joseph Gorski
The HPCMP CREATE-SH Integrated Hydrodynamic Design Environment is a workbench-like desktop application that integrates a suite of hull form design and analysis tools that let users execute round-trip evaluations of hydrodynamic performance in a simplified and timely manner. The IHDE also includes an analysis tool validation engine that provides users with validation information by leveraging historical model test data for comparisons.

For more information on these and other computing topics, please visit the IEEE Computer Society Digital Library at www.computer.org/csdl.