



ARGONNE'S NEK5000 FLUID DYNAMICS SIMULATION TOOL SPEEDS DESIGN, REDUCES TIME-TO-MARKET

THE OPPORTUNITY

In order to cut costs and speed up the development process of new innovations, companies rely on simulation software to test their products and see how they might be expected to perform in the real world.

This is especially true for testing modifications to complex and expensive equipment, where it may be extremely difficult or dangerous to conduct real-world experiments, such as in nuclear power plants.

Scientists and government agencies also rely on simulations to assess risk, model potential changes under various scenarios, and look at complex problems on very large scales. But running complex simulation software can be expensive, as it relies on access to high-performance computers. The faster and more efficient simulation software becomes, the less it costs to run, and the more valuable it becomes to people who want to use it.

THE INNOVATION

To provide researchers with access to a fast and accurate simulation model, the U.S. Department of Energy's Argonne National Laboratory developed a state-of-the-art fluid mechanics code known as Nek5000.

Nek5000 provides turbulent flow simulation capabilities for a variety of thermal-fluid problems including nuclear reactors, internal combustion engines, vascular flows, and ocean currents. It has a number of advantages over competing computational algorithms, but most notably it dramatically cuts the time and computational expense needed to find solutions.

THE IMPACT

Nek5000 code is widely applicable for modeling flows and turbulence in a variety of industries.

- Can model heat and air flow through a city, improve fuel efficiency of aircraft engines, and increase the safety and reliability of nuclear reactors
- Hone design solutions by reducing or eliminating complex, inflexible, and expensive testing to focus on solutions
- Cut costs by reducing the technology's time-to-market

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