Looking at Math

COMPLEX DATA CAN'T ALWAYS be understood conceptually. You need to see the information, graphically represented, to better understand it.

That's why the University of California's Davis campus recently installed a visualization system that scientists use for a range of applications that involve visualizing complex data. The system, called a PowerWall, uses stereoscopic projectors, which are arranged three projectors wide by two high to cast an entire image across the wall.

The system is from Fakespace Systems of Marshalltown, Iowa.

The wall is used jointly by the school's virtual reality lab in the Department of Computer Science and by the Institute of Data Analysis and Visualization, said Oliver Staadt, an assistant professor in the computer science department.

The system helps to visualize massive scientific data, he added.

Get on the Grid

IF ONE COMPUTER IS GOOD, many computers—linked—can only be better.

That's the concept behind grid computing. Grid computing applies the resources of many computers in a network to a single problem at the same time—usually to a scientific or technical problem that requires a great number of computer processing cycles or access to large amounts of data.

Grid computing uses the power of a network to work on one problem in tandem.

It requires software that divides and farms out pieces of a program to as many as several thousand computers. Grid computing can be thought of as distributed and large-scale cluster computing and as a form of network-distributed parallel processing.

Now, Land Rover is using a grid-enabled engineering software system from IBM of Armonk, N.Y., to get feedback on the clash status of its designs. The truck maker in Warwick, England, uses grid technology tied to workstations that run the Catia CAD system from Dassault Systèmes of Paris.

The grid system cuts the time that analysts spend running clash analyses, said Dave Walker, manager of vehicle packaging at Land Rover.

Pick a Number

IF YOU WANTED A RANDOM NUMBER, historically you could do worse than to pick a sequence from the string of digits in pi.

But scientists at Purdue University in West Lafayette, Ind., now say other sources might be better.

Physicists, like Ephraim Fischbach of Purdue, have completed a study comparing the randomness in pi to that produced by 30 software random number generators and one chaos-generating physical machine.

After conducting several tests, they have discovered that while sequences of digits from pi are indeed an acceptable source of randomness—often an important factor in data encryption and in solving certain physics problems—pi's digit string does not always produce randomness as effectively as manufactured generators do.

"We don't believe these results imply anything about a pattern existing in pi's number set," Fischbach said. He's a professor of physics at the school. "However, it may imply that if your livelihood depends on a reliable source of random numbers, as a cryptographer's might, then some commercially available random number generators might serve you better."

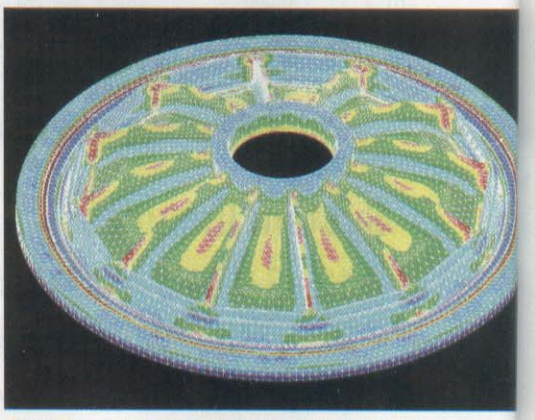
Fischbach tested pi's randomness against the outputs of 31 commercially available random number generators that are frequently used for encrypting confidential information before it is stored or sent electronically. To produce numbers, many of these RNGs use an algorithm—a short set of instructions that can be repeated quickly—and it is the quality of the algorithm that makes one RNG more valuable than another.

This section was written by Associate Editor Jean Thilmany.

Safe in Space

GETTING A ROCKET OR SATELLITE into space—and keeping it there—is no easy job.

SpaceDev of Poway, Calif., makes micro satellites and hybrid rocket propulsion systems and components, and relies on finite element analysis software many steps of the way.



SpaceDev, which manufactures rocket propulsion systems, used FEA software from Noran Engineering to perform nonlinear structural analysis on rocket motor bulkheads.

Engineers use the software to analyze satellites and avionics to make sure they'll survive the launch and to make sure rocket components can do their jobs and still meet weight requirements, said Mike Veno, structural analyst for SpaceDev.

He and his team use the software to ensure that the wide spectrum of vibration seen on launch won't overstress parts.

The company uses the NeiNastran FEA software from Noran Engineering of Westminster, Calif.

NORAN ENGINEERING