

TEMPEST

Summary

The TEMPEST computer software predicts fluid flow and heat transfer over time within 3-dimensional geometries. TEMPEST has been used to help solve engineering problems associated with nuclear waste safety, retrieval, and treatment.

More Details

In Washington State at the Department of Energy's Hanford Site along the Columbia River, long-term efforts are under way to clean up more than 258,000 cubic meters of liquid nuclear waste, stored in 177 high-level radioactive waste tanks.

To assist this effort, PNL has developed the TEMPEST computer software. TEMPEST has been used to help solve engineering problems including:

- the behavior of liquid wastes in Hanford storage tanks
- problem mitigation and safety analysis for one of these tanks
- liquid jet mixing of radioactive sludge in a waste tank at Oak Ridge National Laboratory
- operating conditions for a waste glass melter at the West Valley Demonstration Project.

In one example, TEMPEST was used to model the behavior of a Hanford storage tank that needed special treatment because the liquid waste was releasing hydrogen gas within the tank. TEMPEST simulations were used to help consider how the releases could occur and how they might be mitigated. Different colors represented a range of gas concentrations within the viscous waste fluids. Each color in the spectrum represents a bounding surface around a particular gas concentration.

The numerical modeling and computer simulations performed by TEMPEST are especially useful when the behavior of fluid systems is hazardous or impossible to observe. In chemical processing, environmental restoration, and other efforts where fluid flow and heat transfer are critical, TEMPEST — and tools like it — can save millions of dollars by reducing or eliminating physical prototypes and experiments.

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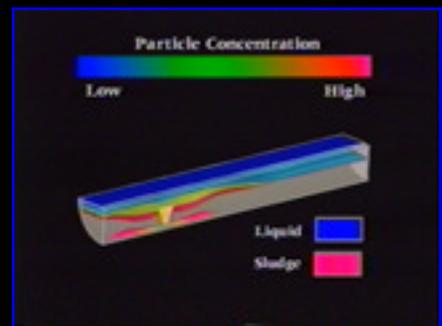
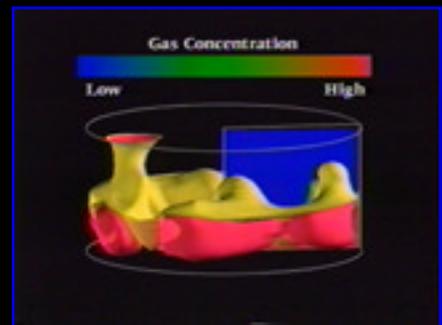
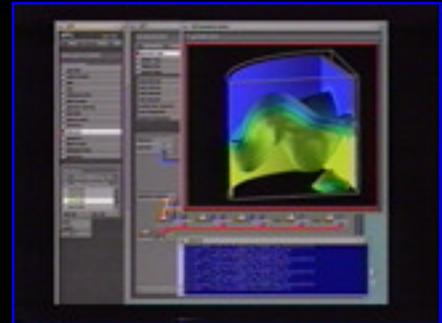
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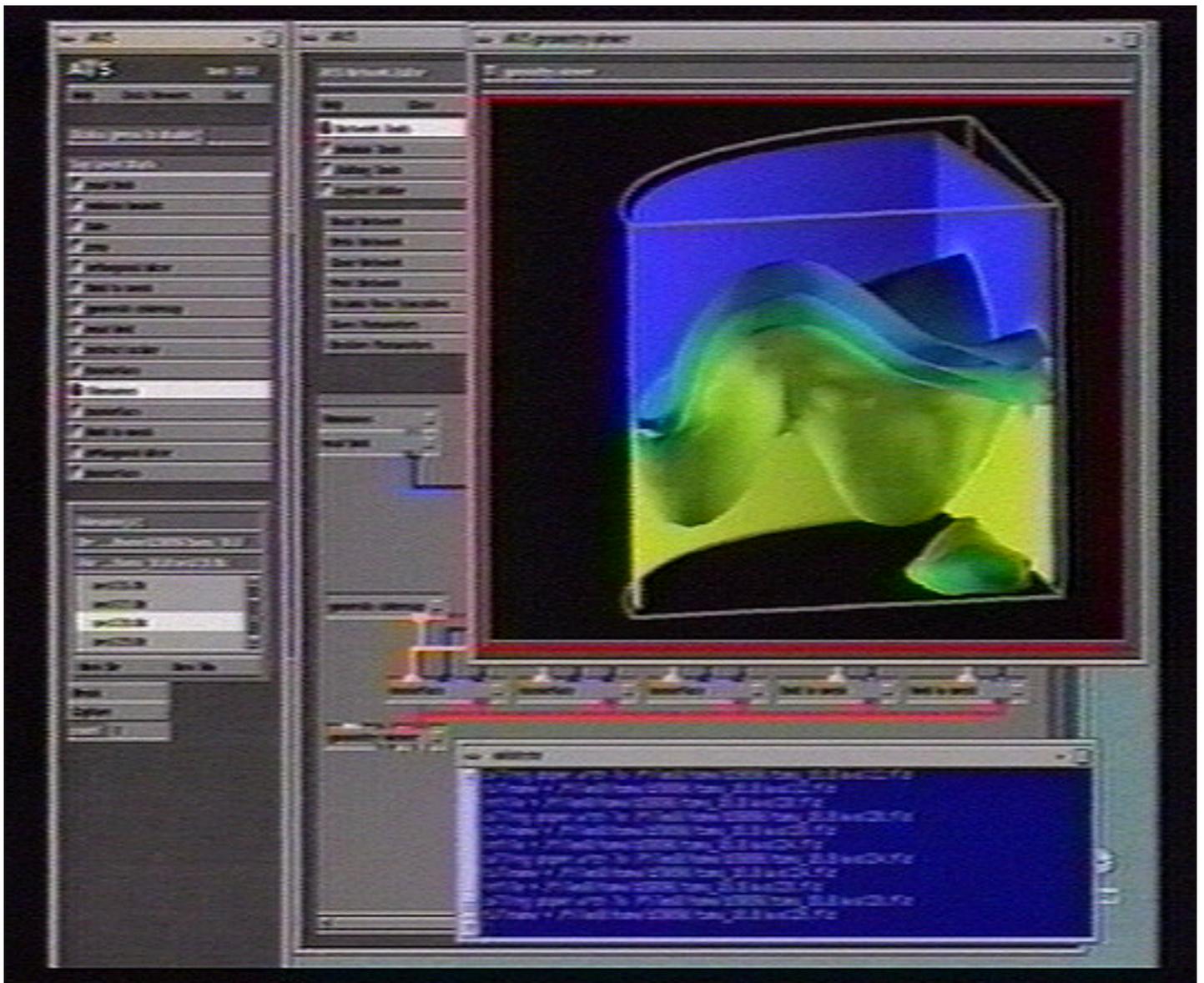
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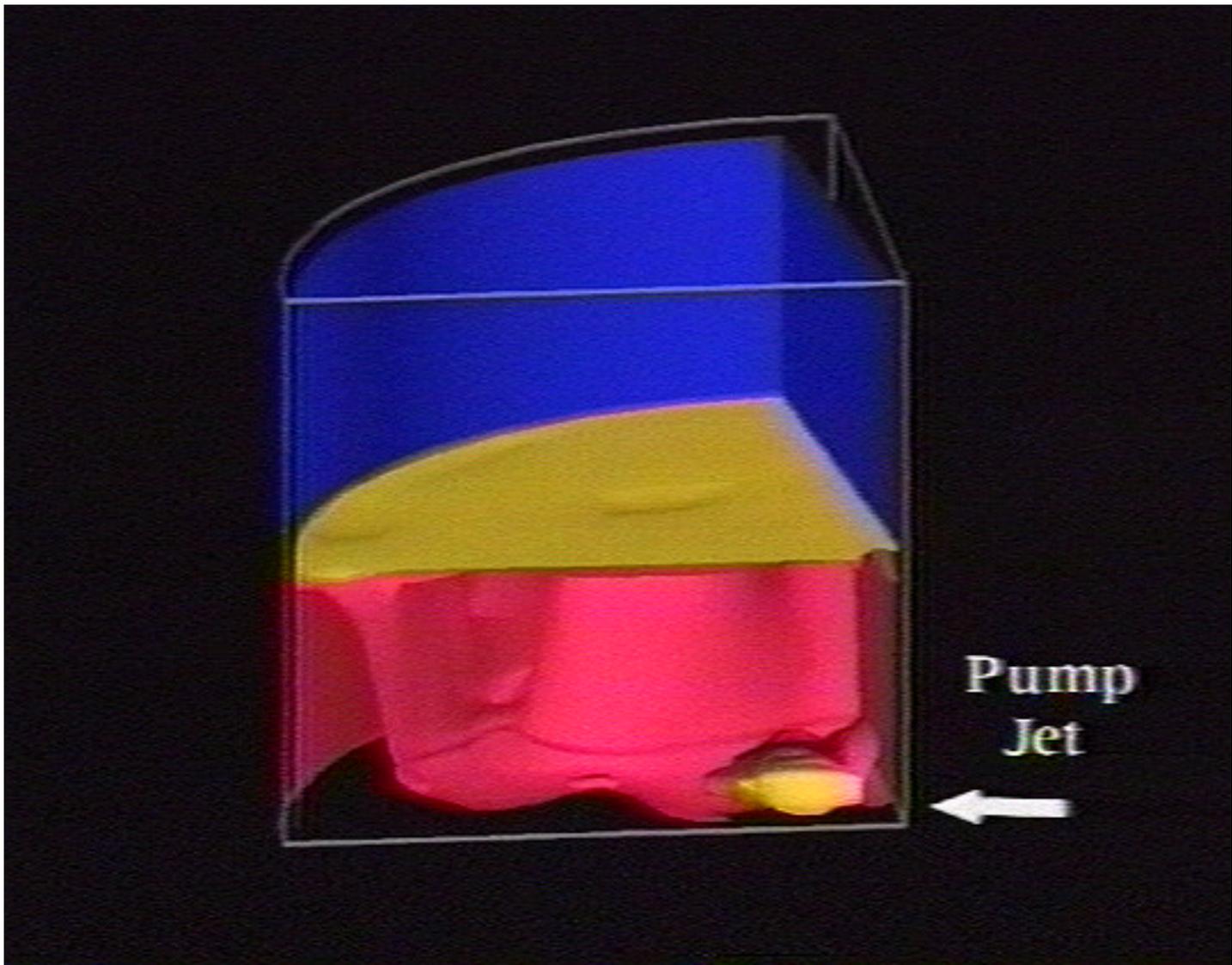


Science



[TEMPEST Brochure](#)



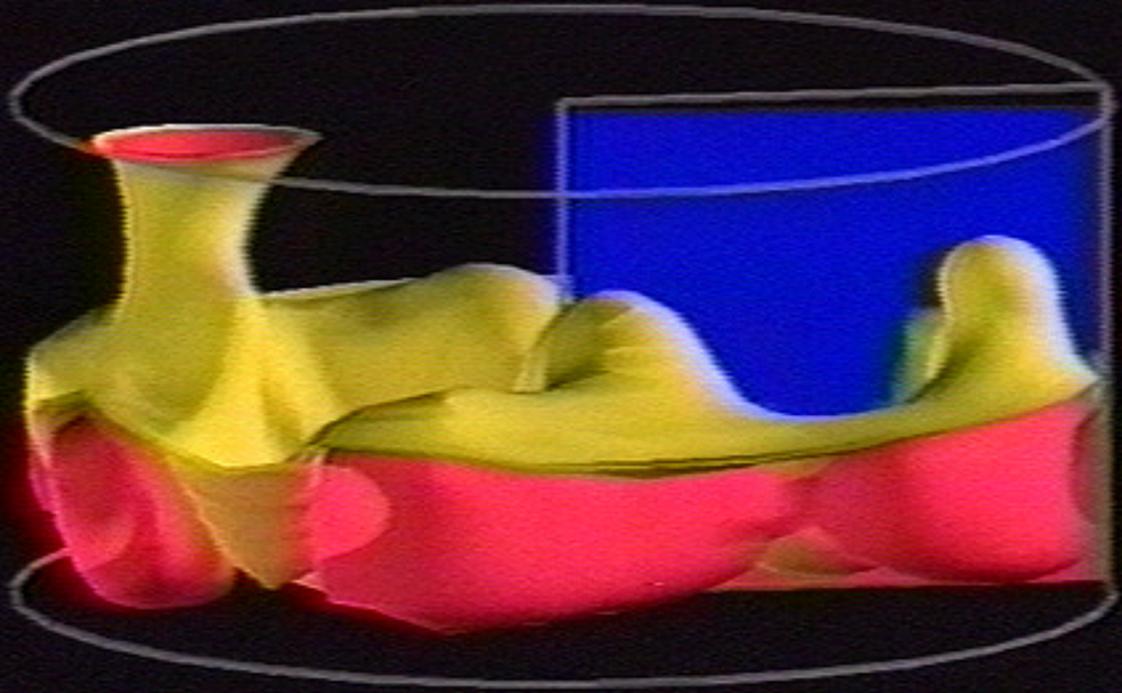


Gas Concentration



Low

High

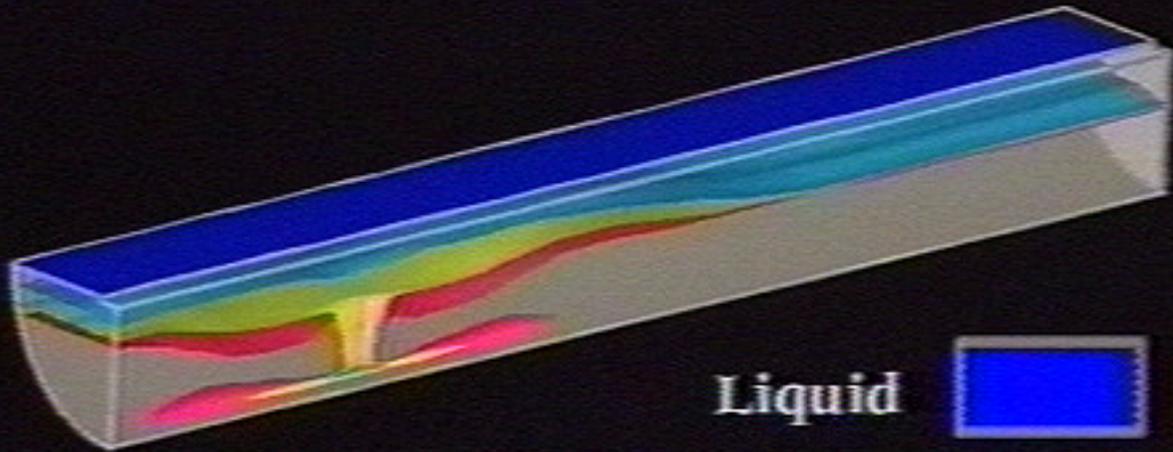


Particle Concentration



Low

High



Liquid



Sludge

