National Personal Protective Technology Laboratory

Computational Fluid Dynamics of Facepiece Leakage

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Background

- **Objectives**
  - To develop a computational fluid dynamics (CFD) simulation of the outward leakage of oxygen around the facepiece of a closed circuit breathing device .
  - To experimentally validate the simulation
- **Partners**
  - NIST Buildings and Fire Research Laboratory
- **Timeline**
  - Completed before start of FY06

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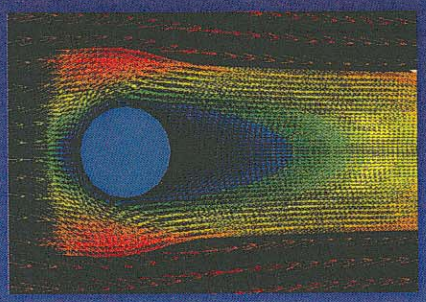
Computational Fluid Dynamics (CFD)



- Computational fluid dynamics (CFD) is the use of computers to analyze problems in fluid flow
- CFD is a means of visualizing and providing enhanced understanding of the resulting solution.
- Modeling and simulations mean nothing, of course, independent of the reality they are supposed to represent. The accuracy of the simulation must be checked, or validated, against experiment

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Protocol

- Actual heads and masks will be scanned into a 3D data set for entry into the CFD software, providing a physical boundary for the problem to be solved.
- Leak geometries representing an imperfect seal will be defined.
- Oxygen concentration fields and flow streamlines will be computed for multiple leak geometries and for both normal and high stress breathing patterns.
- Model results will be compared to planned experimental work.

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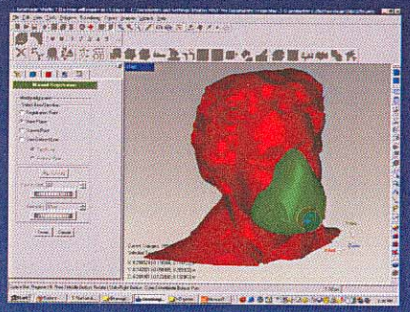
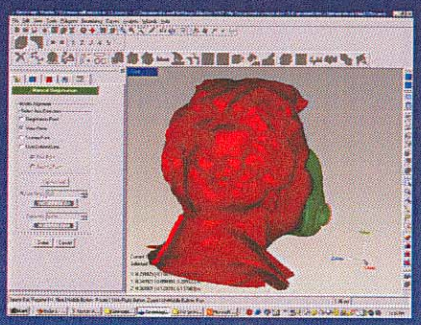
Geometrical Modeling





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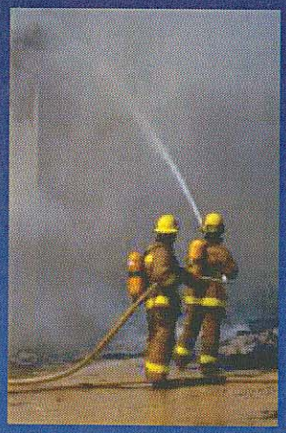
Thank you !



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