

## TWO-PHASE FLOW ANALYSIS

The most comprehensive two-phase thermohydraulic analyzer available.

Ansys' FLUENT, the flow analyzer in SINDA/FLUENT, was designed right from the start to handle the peculiarities of two-phase flows. In fact, its development was initiated specifically to avoid the shortcomings of single-phase analyzers that had been retrofitted to adapt to two-phase problems.

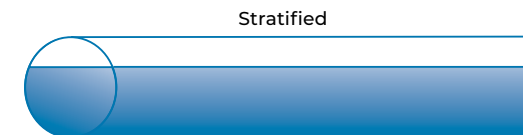
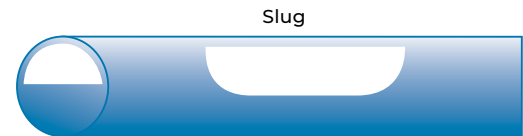
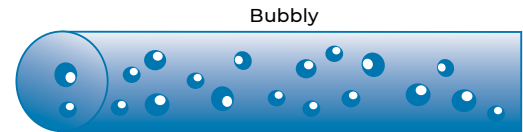
Combined with the heat transfer capabilities of SINDA, the CAD-based interface of FloCAD® (a module of Thermal Desktop®), and the unique capabilities such as parametric analyses, optimization, calibration, and statistical design, the Thermal Desktop suite is truly in a class by itself.

### / TWO-PHASE FLOW CAPABILITIES

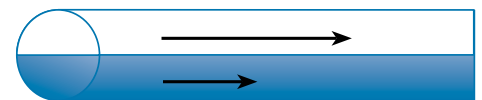
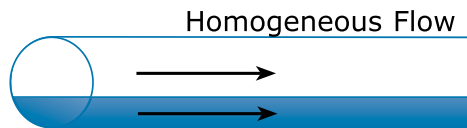
- Complete thermodynamics: phases appear and disappear as conditions warrant
- Two-phase heat transfer correlations built-in or user-defined
- Two-phase pressure drop correlations built-in or user-defined
- Automatic flow regime mapping
- From quasi-steady homogeneous equilibrium to fully transient two-fluid modeling
- Optional slip flow modeling (separate phasic momentum equations)
- Optional nonequilibrium transients (separate phasic energy and mass equations)
- Capillary modeling tools for static or vaporizing wicks
- Optional tracking of liquid/vapor interfaces

### / TWO-PHASE MIXTURE CAPABILITIES

- Mixtures of up to 26 liquids and/or gases
- Optional condensible/volatile component in mixture, including effects such as diffusion-limited condensation
- Optional dissolution of any number of gaseous solutes into any number of liquid solvents, including homogeneous nucleation models



Flow Regime Mapping



Slip Flow, Nonequilibrium Flow, Mixtures, Dissolution...

## / SAMPLE INDUSTRIES

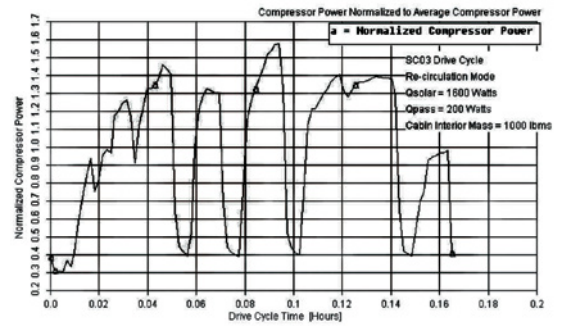
- Automotive (climate control, transmissions, fuel/air)
- Electronics (two-phase cooling, condensation)
- Aerospace (thermal management, propulsion, ECLSS)
- Aircraft (air conditioning, fuel/air)
- Energy Systems (BWR, Rankine cycle power plants)
- Petrochemical and Pharmaceutical (gas transport, steam injection, two-phase processes)

## / SAMPLE APPLICATIONS

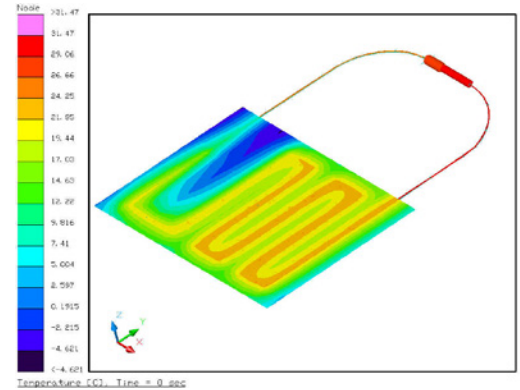
- Condenser, evaporator, and boiler sizing and simulation
- Vapor compression and Rankine cycle analyses, including dynamic responses
- Throttling processes, including Joule-Thompson cooling with two-phase outlets
- Loop heat pipe (LHP) design and simulation
- Two-phase thermosyphon simulation
- Integrated analysis of liquid propulsion systems and cryogenic dewars, including fuel and oxidizer tanks, feed lines, thermodynamic vents and vapor-cooled shields, pogo suppression systems, anti-geyser lines, pressurant systems, line filling, thermally stratified tanks, and turbomachinery cool-down
- Gas storage and distribution systems including the effects of condensation
- Fuel/air systems
- Waterhammer and other fast transient effects including flashing, column separation, chugging and other oscillations in two-phase lines
- Condensing air heat exchangers and wet air psychrometrics, including condensation on electronics
- Fuel cells and support equipment

## / CUSTOMIZATION AND CONSULTING

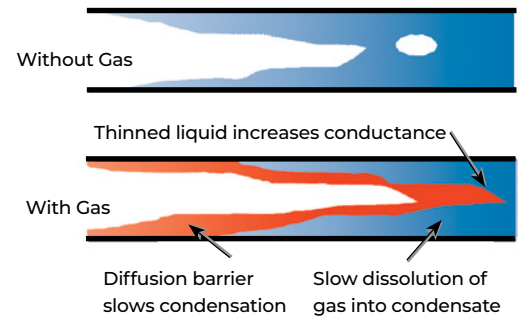
CRTech provides consulting in the specialized field of two-phase systems.



Vapor Compression Cycle Dynamics



Loop Heat Pipe Design and Analysis



Complex Phenomena Example: Condensing in the Presence of Noncondensable Gases

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When visionary companies need to know how their world-changing ideas will perform, they close the gap between design and reality with Ansys simulation. For more than 50 years, Ansys software has enabled innovators across industries to push boundaries by using the predictive power of simulation. From sustainable transportation to advanced semiconductors, from satellite systems to life-saving medical devices, the next great leaps in human advancement will be powered by Ansys.

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