

Advanced Steam Supply System Model



L3 MAPPS' advanced thermal-hydraulic model (ANTHEM™) is based on a rigorous application of the equations of mass, momentum, and energy conservation and implicit numerical techniques. ANTHEM™ has been successfully installed and validated on numerous simulators and simulator upgrades currently certified for training.

ANTHEM™ has been specifically designed to ensure faithful real-time simulation of both single and two-phase flow under all plant operating conditions. The model accurately simulates:

- Normal and abnormal plant conditions
- Major transients such as steam line breaks, loss of feedwater, tube leaks, load rejection and turbine trips
- Draining, filling and venting, as well as nuclear mid-loop operations

A single model is used for all operations without switching to reduced nodalizations or simplified models. The model takes into account such phenomena as feed and bleed cooling, shrink and swell, loop seals, natural circulation, flow stagnation, local boiling and condensation, phase separation and the effect of local buildups of void or non-condensables.

ANTHEM™ is a non-equilibrium, non-homogeneous, drift flux model. The conservation equations consist of three mass conservation equations for liquid, water vapor and non-condensables, two energy equations for liquid and gas mixture and the momentum equation for

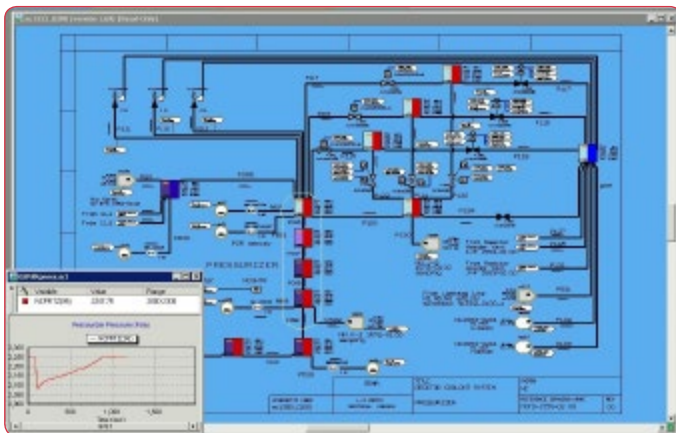
the liquid-gas mixture. The mass and energy equations are solved at each node and the momentum equation is solved at each link. The drift flux model is used to resolve gas and liquid velocities from the mixture momentum equation. Nodalization is determined by system geometry and fidelity requirements and is not compromised by either calculation cost or stability constraints. An implicit numerical technique is used to ensure stable response under all conditions.

An ANTHEM™ model is graphically created and maintained in the Orchid® Modeling Environment (Orchid® ME) graphical simulation environment. The seamless integration with Orchid® ME provides a number of significant advantages including:

- Graphical model design
- Model and code standardization
- Multiple model configurations
- Integrated tracking of calibration and reference data
- Superior graphical testing and visualization environment.

ANTHEM™ has been proven successfully on nuclear and fossil-fuelled plant simulators worldwide.

Complementing L3 MAPPS' Orchid® Total Development and Simulation Environment, ANTHEM™ is an advanced simulation software package that demonstrates L3 MAPPS' long-term commitment to excellence and innovation.



MAPPS

L3 MAPPS

8565 Côte-de-Liesse
 Montréal, Québec
 Canada, H4T 1G5
 Tel: +1-514-787-5000
 Fax: +1-514-788-1442
 Email: power.mapps@L3T.com
 www.L3T.com/MAPPS
 LinkedIn: L3 MAPPS