Global Engineering Services

GOTHIC™ Analysis Capabilities

Background

The GOTHIC™ computer code is a state-of-the-art program for modeling thermal hydraulic transients with multiphase, multicomponent fluid flow. These capabilities make GOTHIC an excellent tool for accurately modelling complex heatup and flow balance calculations.

Westinghouse maintains a license to use GOTHIC with staff engineers using the code on a daily basis to solve a wide variety of engineering issues.

The GOTHIC code has undergone extensive review and validation against a large array of tests. The scope of the validation program examines the code capability for predicting pressure and temperature as well as hydrogen distribution and mixing under various conditions.

Description

Westinghouse has developed GOTHIC models for containment design, equipment qualification and auxiliary building models for high energy line breaks and loss of HVAC analyses.

Westinghouse has used the GOTHIC code to address Post-Fukushima Extended Loss of AC Power (ELAP) requirements by modeling sub-compartment room heat-up conditions and to demonstrate the effectiveness of adding auxiliary equipment.

The GOTHIC code has also been used by Westinghouse to investigate thermal hydraulic transients within specific systems. For example, the effects of service water system degradation on the component cooling water supply to the reactor coolant pumps has been evaluated to characterize the time available for operator action.

Westinghouse has developed GOTHIC models of the reactor coolant system for loss of residual heat removal analyses. These models can be used to calculate time to boil or determine various operator actions that could be implemented in recovery procedures.

To perform the containment design basis accident analyses for the Westinghouse AP600™ and AP1000® containment designs, special subroutines were developed and added to the code that modeled heat and mass transfer to and from evaporating and condensing films. The resulting code version, WGOTHIC™, was approved by the U.S. Nuclear Regulatory Commission (NRC).

Benefits

Westinghouse maintains a dedicated staff of GOTHIC users who routinely develop new models and perform analyses. This ongoing use ensures effective modeling techniques are brought to bear on each engineering challenge.

Westinghouse can perform the entire scope of work or can build GOTHIC models for your use or provide an independent review of a model built by another organization.

Experience

With our many years of thermal-hydraulic transient analysis experience, coupled with our experience in developing and licensing of applications involving GOTHIC, Westinghouse is uniquely qualified to develop, qualify and license models to perform analysis for a wide range of applications.

If there is a need for an analysis outside of those described here, please contact Westinghouse to determine how best GOTHIC can be applied to your situation.

Westinghouse

Westinghouse Electric Company
1000 Westinghouse Drive
Cranberry Township, PA 16066

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www.westinghouse**nuclear**.com