ADVANCED MODELS

High Performance Reactor and Thermal-Hydraulic Models

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Comet™ and Comet Plus™ are advanced models for the simulatio[illegible]

Comet, primarily applied to the simulation of Pressurized Heavy Water Reactors (PHWRs), solves diffusion equations by using the mesh-centered finite difference method modified by the application of the Generalized Equivalence Theory in the calculation of homogenized parameters.

Comet Plus, used for simulating Light Water Reactors (LWRs) and Gas-Cooled Reactors (GCRs), solves the diffusion equations by using the Nodal Expansion Method (NEM). The NEM represents the flux by a fourth-order polynomial and yields unprecedented accuracy.

Both Comet and Comet Plus are true three-dimensional models. A minimum of one radial node per fuel assembly/channel is used. The neutron diffusion equations are solved at each node at each time step without relying on approximate methods based on a space-time factorization.

Each node takes into account:

- Xenon, Iodine, Samarium and Promethium concentrations
- Six delayed neutron groups for LWRs and 15 for PHWRs
- Decay heat calculations are carried out using a set of 23 decay heat precursors
- Neutron source strength
- Fuel burn-up, Plutonium build-up and depletion of burnable poisons, if applicable

Control rods are treated as individual [illegible] entities and shadowing effects are fully simulated. The models account for variable enrichment fuel and modern fuel designs.

The calculation of the flux at the in-core detector locations are achieved by reconstructing the flux, as a function of the local nuclear properties, in the nodes where detectors are present. Very localized effectime model parameters.

Orchid CB accepts plant data from several typical

lattice and fuel design codes such as CASMO, SIMULATE-3, ANC, SCIENCE and others.

Finally, Orchid CB facilitates implementation of Recommendation 6 of INPO's SOER 96-02 to provide cycle-specific simulator training. With Orchid CB's Initial Condition (IC) transfer mechanism, users can easily age

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ANTHEM™, our advanced thermal-hydraulic model is based on a rigorous application of the equations of mass,