The Use of KMS Capabilities for PWR Containment Studies

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The KMS large-scale test facility is designed for 3D experimental modeling of heat- and mass transfer processes, distribution and stratification of steam-gas mixtures, hydrogen (helium), and aerosols inside PWR containment.

The KMS containment shell is a metal cylinder with hemispherical dome. The outer wall of the shell is thermally insulated. The internal metal structures separate the containment space into 11 connected compartments. The total containment volume is 1920 m3. Provision is made for modifying the configuration and varying the number of the compartments.

The maximum design pressure is 0.54 MPa and the maximum design temperature is 150 oC.

The KMS containment is equipped with air, steam, and helium injection systems, sprays, and heat removal system.

KMS comprises a model of the Passive Containment Cooling System for NPP-2006 Project (LNPP-2, Sosnovy Bor).

KMS has about 1000 channels for temperature, pressure, flow rate, level, velocity, and heat flux measurements. Measurement instruments and conditions are experiment-specific and chosen depending on experiment program and objectives.

Gas analysis system of KMS is designed for automatically measuring steam and gas concentrations at 10 points inside containment. An analysis of measured data is carried out by mass spectrometer and gas chromatograph systems. The number of sampling points and their locations can be varied depending on experiment program. KMS has an up-to-date data acquisition and control system (DACS) on the basis of modern computer hard- and software. The DACS records, stores, and displays experiment data on VDU, and executes monitoring and control functions. The DACS has an open modular architecture and can be extended if there is a need to enhance capabilities or apply upgrades.