1. Thermal stripping experimental Facility

Description:

This facility is dedicated for the thermal stripping experiments on the sodium cooled fast reactor components. In the facility the thermal stripping phenomena is simulated by hot and cold fluid jets coming out of the nozzle kept at the bottom of the test specimen. The stripping phenomenon is captured through a set of thermocouples attached to the test specimen and data is acquired through high precision data acquisition system available with set up. This facility is extensively used for understanding the thermal striping phenomena at various locations of the reactor assembly of PFBR.

Inside reactor/Outside reactor

This facility is outside the reactor

Operating Range:

In this facility the striping phenomena is simulated by the hot and cold water jets. Cold water of up to 5^0C and hot water up to 95^0C is possible with this set up. The cold water and hot water is generated by the refrigeration and hot bath systems available with the setup

Instrumentation

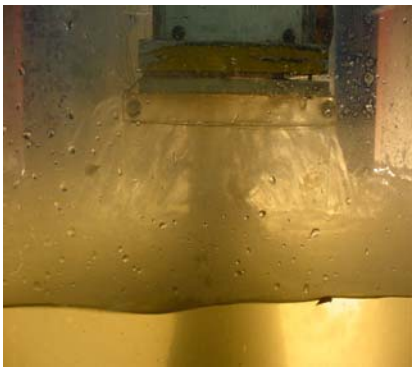
This facility is well instrumented to monitor mainly the temperature fluctuation and strain variation using K-type thermocouples and strain gauges respectively. The data is acquired and stored in a 36 channel data acquisition system with post processing software.

Current status and availability

This system is currently operational and available for undertaking further R&D works in related areas.

Uniqueness

This facility is used for validation of the computer codes and confirming the analyses results for PFBR



2. Thermal ratcheting facility

Description:

This facility is used for studying the thermal ratcheting phenomena in the cylindrical shells due to oscillating temperature front. The facilities have got the option to test vessels of various diameters under different operating temperatures. The facility basically employs the induction heating technique to simulate the ratcheting behavior under constant primary tensile loading.

Inside reactor/Outside reactor

This facility is outside the reactor

Operating Range:

The set up can be used for studying the ratcheting phenomena up to an operating temperature of 650^0C and with internal pressure of 7 bar.

Instrumentation

Facility is well instrumented to monitor various parameters such as temperature, strain, displacement with the help of a 48 channel data acquisition system for acquiring and post processing the data.

Current status and availability

This system is currently operational and available for undertaking further R&D works in the related areas.

Uniqueness

This facility is used for studying the ratcheting phenomena at various locations in reactor assembly.

3. Creep fracture testing facility

Description:

To conduct creep fatigue experiments on the sodium cooled fast reactor piping system. Capability to perform cyclic loading tests on specimen in the creep regime. The temperature of the specimen is brought to the required value by using hot air generating facility available with the test set up. This facility is extensively used for studying the fracture behavior of the pipe bends operating at creep regime and fatigue loading.

Inside reactor/Outside reactor

This facility is outside the reactor

Operating Range:

The set up can be used for studying the creep fracture phenomena with temperature up to 650^0C

Instrumentation

Facility is well instrumented to monitor various parameters such as temperature, strain, displacement with the help of a 48 channel data acquisition system for acquiring and post processing the data.

Current status and availability

This system is currently operational and available for undertaking further R&D works in the related areas.

Uniqueness

This facility is extensively used for studying the creep fracture behavior in the sodium piping components.

4. Fatigue test facility

Description:

This facility is dedicated for conducting experiments to study the fatigue behavior of various fast reactor components under fatigue loading. This facility consists of Hydraulic actuators of capacities ranging from 5 t to 100 t with capability to perform synchronous motion between different actuators (up to six actuators). This facility is used for studying the crack propagation under cyclic loading for different fast reactor components.

Inside reactor/Outside reactor

This facility is outside the reactor

Operating Range:

The set up can be used for studying the crack propagation under fatigue loading and leak before break experiments with load ranges from 5t to 100 t with facility to simultaneous operation of 6 actuators together. It is possible to give sinusoidal,, triangular, stepped and random excitations.

Instrumentation

Facility is well instrumented to monitor various parameters such as temperature, strain, displacement with in data acquisition and data processing software. This system is also equipped with thermal imaging system to study the crack propagation behavior.

Current status and availability

This system is currently operational and available for undertaking further R&D works in the related areas.

Uniqueness

This facility is extensively used for studying the leak before break phenomena in the sodium piping system for the sodium cooled fast reactors.

5. Seismic qualification test facility

Description:

The facility consists of a 10 t multi axial shake table (SEIST) and 2 t electro dynamic slip table. Work is in progress to set up a high capacity seismic shake table (HCST) with payload of 100 t, which will be operational within one year.

Inside reactor/Outside reactor

This facility is outside the reactor

Operating Range:

The 10 t shake table is a 6 degree of freedom system with pay load of 10 t and frequency range of 0- 100 Hz. The maximum horizontal displacement is 150 mm with acceleration 1.5 g and vertical displacement is 100 mm with acceleration 1 g.

The frequency range of electro dynamic shaker system is 5-1000Hz with acceleration up to 10 g.

The up coming 100 t shake table has a frequency range of 0 -100 Hz with horizontal acceleration of 1.6 g and vertical acceleration of 1.5 g.

Instrumentation

The instrumentation set up consists of a 64-channel data acquisition system with accelerometers, stain gauges, dynamic pressure transducers, LVDTs and Laser Sensors for measuring various responses. This facility is well suited for studying the phenomena such as dynamic pressure distribution and liquid sloshing under seismic loading.

Current status and availability

This system is currently operational and available for undertaking further R&D in seismic design and qualification of fast reactor components.

Uniqueness

The 10t shake table and 2 t slip table are used extensively for seismic qualification various electrical and electronic components of PFBR and PHWR in addition to various R &D programmes in the field of seismic design of nuclear power plant components.

The 100 t HCST that will be operational by the middle of 2011 is one of the largest shake table systems available in Asia. The facility will cater the needs of the ongoing R &D activities in the sodium cooled fast reactors.

6. Fuel pin rupture

Description:

This facility is used to carry out the fuel pin rupture experiments under high pressure and temperature. Basically used for studying the allowable number of weld repairs in the fuel pin end plug.

Inside reactor/Outside reactor

This facility is outside the reactor

Operating Range:

The operating temperature is 650^0C and operating pressure is 200 bars. Up to 36 fuel pins can be tested at a time.

Instrumentation

Facility consists of K- type thermo couples at various location of the hot chamber.

Current status and availability

This system is currently operational and available for undertaking further R&D in seismic design and qualification of fast reactor components.

Uniqueness

This facility is extensively used for deciding on the number of weld repairs acceptable in the fuel pin end plug welding for the PFBR.