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PETER: PWR Fuel Element Tests Facility

Thermal-hydraulic testing of fuel assemblies

Full scale thermal-hydraulic test facility for PWR fuel assembly vibration and bowing behavior under various geometric and flow conditions

Challenge

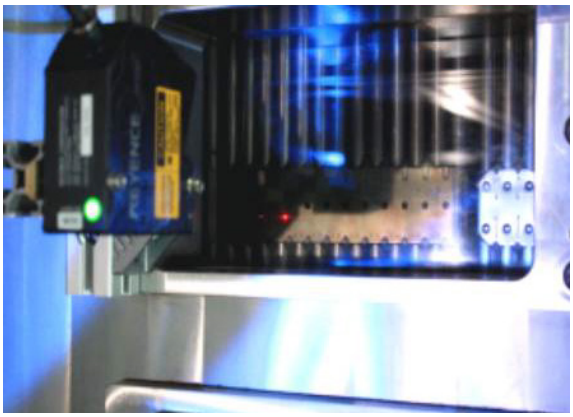
Reliable and safe fuel assembly (FA) operation at maximum performance is essential for an optimized Nuclear Power Plant operation. This must be ensured for a wide variety of FA designs in combination with a number of different reactor specifics. The plant economics can be improved by enhancing fluid-dynamics performance with new fuel assembly designs that (i) improve coolant mixing for higher power levels and higher burn-ups, (ii) increase in-core reliability of FA and (iii) optimize FA costs. Reliable FA test campaigns are required to accompany the development of FA design.

Solution

We operate the PETER test facility with maximum flexibility in geometric and flow boundary conditions in order to test numerous different FA designs.

PETER enables to investigate the following phenomena:

- Vibration and bowing behavior of FA
- Influence of neighboring FA on mechanical behavior of FA
  - Neighboring FA of a different design
  - Pre-shaped neighboring FA (C or S bow)
- Influence of specific geometric boundary conditions (FA position at core shroud, edge or line position)
- Influence of cross-flow on mechanical behavior of FA
- Sensitivity of spacer design on mechanical behavior of FA
- Pressure drops for developing new FA spacer designs or for optimizing FA geometries



Laser measurement in PETER test facility

Technical information

Laser-based measurement techniques are used to investigate the main FA characteristics:

- Laser triangulation measures vibration behavior of the FA structure
- Laser vibrometer quantifies fuel rod vibration behavior
- Laser triangulation measures static movement of the entire FA
- Laser-doppler velocimetry quantifies the flow velocity distribution between fuel rods

Customer benefits

- High flexibility of the test loop for cost-optimized test campaigns
- Reliable test results through accreditation as test and inspection body in accordance with ISO 17025 and 17020, accepted by ILAC

Your performance
is **our** everyday **commitment**

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