Subsecond Multi-Property Measurement for Thermal Design

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We have developed a method for simultaneously measuring four kinds of thermophysical properties of electrically conductive materials at high temperatures. In this method, a plate-shaped sample is rapidly heated up to a high temperature by passing an electrical current pulse through it. After that, a surface of the sample is irradiated by a laser pulse. Thermal conductivity, specific heat, total emissivity, and electrical resistivity are derived from the temperature response of the sample due to the electrical-optical hybrid pulse heating. The major advantage of this method is the minimum exposure of the sample to high temperature, which can minimize the contamination of the sample.

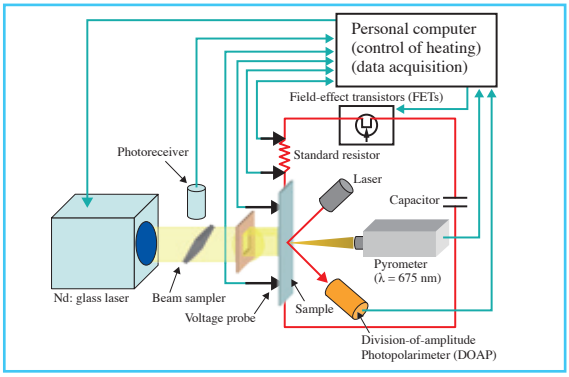

Figure : Schematic diagram of electrical-optical hybrid pulse-heating system for a subsecond multi-property measurement.

Calibration Facility for Feed Water Flowmeters in Nuclear Power Plants

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We are developing ultra-large water flow rate standard up to Reynolds Number of 16 million. The facility can achieve real traceability for feed water flowmeters used at nuclear power plants, and the plants will be able to get uprated by reducing uncertainty of the flowmeters. This technology will contribute to the reduction of CO_2 emission from hydrocarbon-fired power plants.

Figure 1: Overhead flow tank and test channels at ambient temperature.

Figure 2: Hot water circulating channels and working standard flowmeters.