

Paper Number:

DOE/METC/C-97/7263

Title:

High-Pressure Optical Combustion Probe

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Conference:

Advanced Coal-Fired Power Systems '96 Review Meeting

Conference Location:

Morgantown, West Virginia

Conference Dates:

July 16-18, 1996

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HIGH-PRESSURE OPTICAL COMBUSTION PROBE

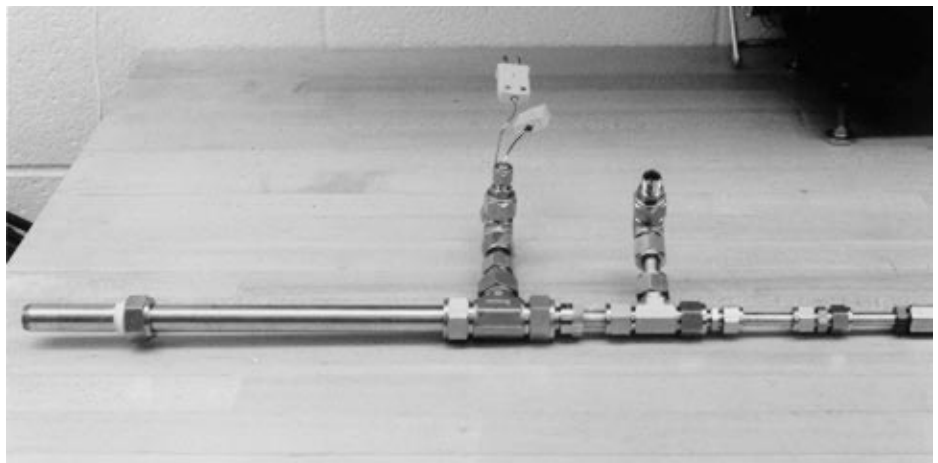
Capabilities

An optical access probe was developed to meet the demands of a gas turbine combustor in a Cooperative Research and Development Agreement (CRADA) with the Westinghouse Science and Technology Center.

The probe is water-cooled, has no external fittings, and is pressure-sealed with a conventional compression fitting. The probe utilizes a 1.0-mm diameter sapphire rod as a lightpipe for optical access and fiber optic coupling to the spectroscopic experiments. This is coupled with a fused silica optical fiber to the optical experiments employed to study the combustion process. The probe has been tested to 10^6 Pa in a test combustor exhibiting 10^5 Pa instability oscillations. To test its spectral range, the probe investigated OH emissions at 310 nm, C_2 and CH emissions from 400 to 500 nm, Near IR emissions from 800 to 1,800 nm, and temperature measurements using an Accufiber detection system.

Opportunities

This probe is designed to meet the needs for optical access in a high-temperature and high-pressure environment. Its construction requires only one welded component with off-the-shelf compression fittings. The experimental data is from light emission collected from a narrow, well-confined cone. The spectral range is from the mid-ultra violet to the near infrared. The probe has no external components to dislodge and damage expensive equipment downstream. The lightpipe may be purged to prevent optical obstruction in a dirty environment.



High-Pressure Optical Combustion Probe

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Test Modules