

# SICE2013 講演会オーガナイズドセッション報告

温度計測部会では、2013年9月14日～17日に名古屋大学で開催された SICE Annual Conference 2013 において、“Recent Advances in Temperature Measurement”をテーマとしたセッションを企画しました。セッションでは計5件の口頭発表が行われ、活発な質疑応答と議論がありました。ご発表頂いた講演者とセッションに参加頂いた方に感謝致します。

講演の題目並びに概要は下記の通りです。SICE2013については <http://www.sice.or.jp/sice2013/>をご覧ください。

講演詳細については、SICE 発行の論文集(DVD)をご参照下さい

## 1. Measurement of Thermal Radiation from the Hydrogen Storage Metal

**Aizawa Hiroaki : Toyo Univ.**

Abstract: Hydrogen has attracted much attention as innovatory energy instead of oil and coal. Hydrogen gas has been expected to use in a wide area such as fuel cell, hydrogen vehicle and rocket engine. But hydrogen gases have a problem of flammable and very volatile. Consequently the electrical hydrogen gas sensor cannot to be use in hydrogen gas atmosphere. Then we need to safety hydrogen gas sensor that can use in a hydrogen gas. Optical hydrogen sensor using hydrogen storage al-loy such as palladium are safe because they do not generate electric current during the measurement pro-cedure. Thus, these sensors have been extensively studied. At present most optical hydrogen sensor is based on volume change of hydrogen storage alloy. In this paper, we propose a novel optical hydrogen gas sensor based on exothermic reaction of hydrogen storage alloy. The thermal radiation of a hydrogen storage alloy has been studied for a hydrogen gas sensor application.

## 2. Initial Tests of the Resonator for a New Acoustic Gas Thermometer at NMIJ/AIST

**Misawa Tetsuro : NMIJ/AIST**

**Widiatmo Januarius : Vincentius National Inst. of Advanced Industrial Science and Tech.**

**Kano Yuya : NMIJ/AIST**

**Yamazawa Kazuaki : NMIJ/AIST**

Abstract: For the preparation to the planned redefinition of the unit of temperature, kelvin, we are now constructing a new acoustic gas thermometer to achieve abilities in measuring the thermodynamic temperatures. One of the key com-ponents of the system is the resonator. We are constructing a quasi-spherical resonator and are performing initial tests. The resonator is made from oxygen free copper C1011 with cavity of nominal radius 62 mm. It has a thermal anchor near to the southern hemisphere equator. This design is a measure to minimize the effect coming from the deformation in the cavity of the resonator due to gravity. We report in this paper the initial microwave measurements for the qua-si-spherical resonator. We compare the results with an existing spherical resonator with the conventional design.

## 3. Demonstration System for Radiation Thermometry Utilizing Emissivity-Free Method

**Iwasaki Tomoyuki : Chino Corp.**

**Yamada Yoshiro : NMIJ/AIST**

**Ishii Juntaro : NMIJ/AIST**  
**Shimizu, Takao Chino Corp.**  
**Kadoya, Satoru Chino Corp.**

Abstract: Two techniques to compensate for unknown distributed emissivity of the object for measuring surface temperature with a thermal imager are presented. For both techniques, the reflected image of an auxiliary source is superimposed on the thermal image of the object. To demonstrate both methods, a radiation thermometry system with a specially designed compact thermal imager has been developed. In this paper, the design, function, and performance of the system are presented.

**4. Effect of Coolant Water and Intake Air Temperatures on Thermal Efficiency of a Spark Ignition Engine**

**Kuboyama Tatsuya : Chiba Univ.**  
**Moriyoshi Yasuo : Chiba Univ.**  
**Iwasaki Mitsuru : Calsonic Kansei**  
**Hara Junichiro : Calsonic Kansei**

Abstract: An improvement of thermal efficiency is strongly demanded for gasoline engines. In this study, experiments were carried out to investigate the effect of intake air temperature and coolant temperature on brake thermal efficiency, heat loss, friction loss and knocking of spark ignition engine. Experimental results showed that, during low load operation, intake air temperature has a little effect on brake thermal efficiency. During high load operation, a decrease in intake air temperature improved brake thermal efficiency due to advanced ignition timing leading to decrease in exhaust loss. Also, an increase in engine block temperature was effective to improve brake thermal efficiency during low load operation. A decrease in cylinder head temperature was effective for improving brake thermal efficiency.

**5. Size-Of-Source-Effect Correction for Radiation Thermometers Calibrated by Fixed-Point Blackbodies**

**Yamada Yoshiro : NMIJ/AIST**  
**Wang Yunfen : NMIJ/AIST**  
**Shimizu Yukiko : NMIJ/AIST**  
**Minahiro Kiyomi : NMIJ/AIST**

Abstract: Size-of-source effect (SSE) correction is required when a radiation thermometer measures a radiating source which has a different size from the reference blackbody source that the thermometer has been calibrated with. A simple method for this SSE correction is through the effective source diameter of the fixed-point source. In this paper, the method is demonstrated for a new compact fixed-point blackbody furnace which can be operated for a wide variety of fixed-point types ranging from In to Cu points. A value for the effective source diameter and its uncertainty is derived, which can be applied globally to all fixed-point types and to a wide range of radiation thermometers.