

# Poster Session

## Poster Sessions for Academia

19th November

**1. Fluid Engineering Lab., Graduate School of Hiroshima University** **Yukihiko Ichikawa**  
**Effect of Hydro-Erosive Grinding of Injector Hole on Fuel Spray Characteristics in Direct Injection Gasoline Engine**

In direct injection gasoline engines, nozzle holes of injectors need the high accuracy processing technique, therefore, the hydro-erosive grinding is adopted. In this study, the effect of the nozzle inlet geometry on spray characteristics was investigated by using with and without hydro-erosive grinding nozzle.

**2. Vehicle Engine Lab., Graduate School of Meijo University** **Yosuke Uchiyama**  
**Effect of Piston Skirt Surface Treatment on Piston Assembly Friction in an Eco-Mileage Vehicle Engine**

Utilizing a friction measurement apparatus with a floating cylinder liner in an eco-mileage vehicle engine, the effect of surface treatment on the piston skirt on piston assembly friction was investigated. Result indicated that, the friction mean effective pressure was significantly reduced for the piston with the combination of fine particle bombarding and MoS<sub>2</sub> compared to the piston without surface treatment.

**3. Graduate School of Nihon University** **Yosuke Abe**  
**Influence of Discharge Behavior under Flow Field on Lean-Combustion by Using an Optically Accessible Engine**

I will report the result of the research about effective discharge behaviors for the formation of flame kernels on the combustion chamber under flow field.

**4. Automotive Lab., Fukui University of Technology** **Prof. Takashi Tsuchiya**  
**Study of Piston Temperature Measurement System used RF-MEMS**

It is extremely important to save energy for prevention of global warming. New generation automotive engine is made up by high compression ratio and low friction by small engine for better fuel consumption. However with increasing higher compression increasing the piston's temperature exceeds a melting point of the aluminum and a piston is damaged. The measurement of good piston temperature of the precision is very important for higher compression piston and good fuel consumption. In this paper we made the measurement of good piston temperature of the precision by RF-MEMS systems.

**5. Graduate School of Hiroshima Institute of Technology** **Hu WenTao**  
**Detailed Flame Measurement in 2-Stroke Gasoline Engine by Eight Ion Probes**

Multiple-ion-probe method is expected to detect the detailed behavior of high-speed combustion phenomena such as knocking. We are developing the measurement system for propagating flame in 2-stroke gasoline engine by eight ion probes. The demonstrational results will be reported in the poster presentation.

**6. Graduate School of Hiroshima Institute of Technology** **Hiroki Yamamoto**  
**Effects of Flame Detection Performance on Wire Diameter of Ion-Probe**

When multiple ion probes are installed by the ion probe method, the dynamic behavior of the flame can be recorded. In this study, the influence of the diameter of the ion probe on the flame detection characteristics was investigated by using four types of ion probes: 0.1, 0.5, 1.0 and 2.0 mm in ion-probe wire diameter.

**7. Graduate School of Hiroshima Institute of Technology** **Naoya Miura**  
**Detailed Measurement of Flames Using Densely Arranged Ion Probes**

By arranging ion probes densely, it becomes possible to improve time and spatial resolution and to capture the detonation phenomenon. In this study, the flame surface shape, velocity fluctuation and propagation direction of the flame were measured more precisely using the multiple-ion probes method.

# Poster Session

**8. Graduate School of Hiroshima Institute of Technology** **Rio Kamei**  
**Effects of Projection Length and Diameter of Ion-Probe on Flame Detecting Characteristics in 2-Stroke Gasoline Engine**

It is expected that the multiple-ion-probe method can detect the details of the behavior along the wall surface of high-speed combustion phenomenon such as knocking. In the present study, we investigated the effects of the projection length and the diameter of ion probe on flame detecting characteristics in 2-stroke gasoline engine.

**9. Lab. of Thermal Engines, Kanazawa University** **Shota Iwai**  
**Investigation of NO and CO Emission from SI-ICE with Bio-Syngas**

**10. Engine Research Lab., Tokyo City University** **Yuki Kokubo**  
**Development of Coaxial Type Thin Film Temperature Sensor for Measuring Heat Flux on Combustion Chamber Wall with High Accuracy**

Reducing cooling loss is important for improving thermal efficiency of internal combustion engine, it is necessary to clarify heat transfer mechanism from combustion chamber gas to wall surface. In order to analyze its heat transfer, authors developed coaxial type thin film temperature sensor with higher accuracy than previous study.

**11. Engine Research Lab., Graduate School of Tokyo City University** **Yuri Gomi**  
**Comparison of Conformity of Friction Loss Reduction Effect between Floating Liner Engine and Multi-Cylinder Engine**

Regarding the evaluation of friction loss reduction of the engine, the consistency of the friction loss evaluation obtained with the floating liner device of the single cylinder engine and the four cylinder gasoline engine was investigated. This poster introduces the FMEP measurement method for the floating liner device and the 4-cylinder engine used in this study, and introduces a comparison between the piston ring and oil viscosity.

## 20th November

**12. Engine Research Lab., Graduate School of Tokyo City University** **Keisuke Goma**  
**Attainment of High Thermal Efficiency and High Output Power with Near-Zero Emissions by Optimizing Jet Geometry in Direct Injection Hydrogen Engine**

Authors proposed new combustion concept named PCC (Plume ignition and Combustion Concept) in which rich mixture of hydrogen plume is ignited just after the completion of injection and burned. And we attained high thermal efficiency and high output power with near-zero emissions by combining PCC, optimized jet geometry, supercharging and lean burning.

**13. Engine Research Lab., Graduate School of Tokyo City University** **Hidemi Ogihara**  
**Measurement of Friction and Seizure Characteristics of Journal Bearings Using a Bearing Testing Machine**

Friction and seizure characteristics for journal bearings were measured with a bearing tester for engine bearings. In addition to showing the characteristics of this testing machine, the characteristics of oil additives such as the presence or absence of a friction modifier, differences in viscosity, surface properties, and differences in characteristics due to the influence of flow rate were clarified.

**14. TICEL, Technion - Israel Institute of Technology** **Dr. Leonid Tartakovsky**  
**Exergy Analysis of an IC Engine with the Reforming-Controlled Compression Ignition**

This poster discusses a novel Reforming-Controlled Compression Ignition (RefCCI) approach mostly from the second law point of view and provides new insights on ways of improving the RefCCI system efficiency. The obtained results show that after reducing some of the irreversibility factors, the RefCCI system efficiency improvement due to second-law optimization can reach up 9.2%.

# Poster Session

**15. TICEL, Technion - Israel Institute of Technology**

**Dr. Leonid Tartakovsky**

**Reforming-Controlled Compression ignition with Methylal as Primary Fuel**

This research examines a possibility of managing the HCCI (Homogeneous Charge Compression Ignition) combustion process through the reforming-controlled compression ignition, by controlling the Methylal reforming products composition (mainly Hydrogen and CO<sub>2</sub>) created in thermo-chemical recuperation (TCR) cycle using engine waste heat.

**16. Lab. of Internal Combustion Engine, Graduate School of Kogakuin University**

**Yuki Izu**

**Evaluation of EGR effect by Bunsen burner method**

The objective of this experiment is to clear the effect of EGR gas on laminar burning velocity fundamentally. The measurement system has been developed and it has been tried the evaluation of EGR gas effect by Bunsen burner method. The optimal EGR condition for engine operation is proposed.

**17. Lab. of Internal Combustion Engine, Graduate School of Kogakuin University**

**Naoki Yagi**

**Improvement of Diesel Engine Performance by Gas Dissolved Fuel**

The objective of this research is improvement of diesel engine performance by using of gas dissolved fuel. The experiment data show this fuel improve 2.0 % of brake thermal efficiency and 4 % of PM concentration by Bosch smoke meter. In addition, it will be reported effect of CO and HC emissions.

**18. Spray & Combustion Science Lab., Graduate School of Doshisha University**

**Kenta Shiomi**

**Study on the Influence of Hydrogen Addition on Combustion and Exhaust Characteristics in a Lean Burn Gas Engine for Power Generation**

Excess air ratio is changed with various hydrogen addition ratios in order to investigate the influence of hydrogen addition on combustion and exhaust characteristics by laminar burning velocity and heat balance in a spark ignition lean burn gas engine using city gas.

**19. Spray & Combustion Science Lab., Graduate School of Doshisha University**

**Annisa Bhikuning**

**Study of the Performance and Emissions Characteristics of Diesel Engine by Bio Hydro Fined Diesel Oil and Diesel Oil in Different EGR**

The comparison of performance and emissions characteristics from BHD oil, waste cooking oil and diesel oil are investigated. The experimental conditions are low and partial loads, EGR are zero, 10, and 20%. The engine speed was at 2000 rpm. The results show that the BHD oil can be an alternative fuel to replace the diesel oil.

**20. Thermal Engineering Lab., Graduate School of Sophia University**

**Bin Guo**

**Development of Carbon-Free Engine Using Ammonia Fuel**

Recently, ammonia has attracted attention as an energy carrier. Compare with compressed hydrogen and liquid hydrogen ammonia has a larger energy density per volume, and it's easy to compound from hydrogen, the conversion rate from hydrogen can be 93.8%. On the other side, as fuel, ammonia also has lots of problems. Such as high ignition temperature, low combustion speed, high vaporization latent heat, etc. We prepare to use CFD, a constant volume combustor, and an engine experiment to overcome the problems.

**21. Thermo-Fluid Lab., Graduate School of Sophia University**

**Hardeep Singh**

**Effect of Dean Number on Heat Transfer Characteristics for Square Channel Helical Coil Sub-Cooled Condenser**

The Helical coil sub-cooled condenser (HCSCC) can provide the most innovative and unique application for the air conditioning system. In the case of automobiles, reduction in air-conditioning load may diminish the vehicular emission, and power consumption as the air-conditioning load is the most power-consuming components after the engine load.

**22. Power Engineering Lab., Graduate School of Tokushima University**

**Rui Kikui**

**Effect of Fuel Injection Rate Control on Diesel Combustion and Histories of Combustion Gas Component Concentrations**

In this study, we investigated effects of fuel injection pattern on diesel combustion and emissions using constant volume chamber equipped with a rapid compression machine. Inverse-delta injection promotes combustion in the whole combustion chamber and prevents the increase in CO and LHC after end of injection.

# Poster Session

## 21st November

**23. Mechanical Dynamics Lab., Toyohashi University of Technology** **Prof. Masami Matsubara**

**Strain Measurement in Tire Tread Block Using Intermittent Digital Camera System**

This study presents a novel imaging system using digital camera for capturing tire tread block deformation. The system is implemented by manipulating a strobe and a digital camera at high speed, making it possible to obtain the pseudo-continuous images by varying the imaging timing for each rotation cycle.

**24. Mechanical Dynamics Lab., Graduate School of Toyohashi University of Technology** **Daiki Tajiri**

**Improvement of Modal Identification by Polynomial Approximation of Residual Modes**

In proposed method, mode components of real part and imaginary part that lie outside of the analysis frequency range are modeled with cubic functions, and iterative calculations are conducted using the mode separation method. It is shown that this method improves the identification accuracy of the modal characteristics.

**25. Mechanical Dynamics Lab., Graduate School of Toyohashi University of Technology** **Masaki Ojio**

**Identification of Modal Properties of Motorcycle Tires by Linear Fit Method**

In high damping systems such as motorcycle tires, it is difficult to identify mode properties because shape peaks cannot be obtained in frequency response function (FRF). For a solution of this problem, reduced FRF data based on radial modes are extracted, and modal properties are identified by Linear Fit Method.

**26. Mechanical Dynamics Lab., Graduate School of Toyohashi University of Technology** **Kohei Takahashi**

**Vibration Reduction of Mechanical Structures by Mutual Mode Kinetic Energy Distribution**

It is still difficult to identify modification parts in mechanical structures and design them for vibration reduction. This study presents a novel extraction of modification parts based on mutual mode kinetic energy distribution. The proposed method can identify the parts as dynamic vibration absorbers and we can reduce vibration based on the DVA theory.

Short presentation schedule (5 minutes presentation for each poster.)

19th November	Poster number	20th November	Poster number	21st November	Poster number
10:00-10:30	1, 2, 3	10:00-10:30	12, 13, 14, 15	10:00-10:30	23, 24, 25, 26
12:45-13:15	4, 5, 6, 7	12:30-13:00	16, 17, 18, 19	-	-
14:45-15:15	8, 9, 10, 11	14:30-15:00	20, 21, 22	-	-