CCRC Clean Combustion Research Center

جامعة الملك عبدالله للعلوم والتقنية
King Abdullah University of Science and Technology

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Major: Future fuels, Combustion laser diagnostics, CFD simulation of combustion and soot.

ACADEMIC QUALIFICATION

◆ Postdoc research fellow in Dept. Mechanical Engineering. Aug 2016 – Present

Clean Combustion Research Center, King Abdullah University of Science and Technology, **KAUST**.

Project: Saudi Aramco's Fuel Combustion Program---Low-Octane Gasoline Compression Ignition (**GCI**)

Principal investigator: **Prof. Bengt Johansson**

◆ Graduate Research Assistant in Dept. Mechanical Engineering. Sept. 2012 – June. 2016

State Key Laboratory of Engines, **Tianjin University**. Tianjin, China.

Thesis: "Experimental and numerical studies on soot formation mechanism for GDI engine."

Advisor: **Prof. Hua Zhao, FREng, Brunel University London**

Degree: Doctor of Philosophy

◆ Joint MS. Student in Dept. Mechanical Engineering. April. 2011 - May. 2012.

State Key Laboratory of Engines, **Tianjin University**. Tianjin, China.

Advisor: **Prof. Wanhua Su, Academician of Chinese Academy of Engineering**

◆ Graduate Research Assistant in Dept. Mechanical Engineering. Sept. 2010 - June. 2012.

College of Mechanical Engineering, **Guangxi University**. Nanning, China.

Thesis: "Experimental study of the spray characteristics of blend fuel with gasoline and diesel."

Advisor: **Prof. Haozhong Huang**

Degree: Master of Engineering

RESEARCH AND WORK EXPERIENCE

◆ **Gasoline compression ignition (GCI) engine**. Postdoc research fellow, KAUST, Saudi Arabia. August. 2016~Present

Saudi Aramco FUELCOM Program

◇ Combustion stratification and stability for low-octane gasoline, Naphtha, in CI Engine

◇ Laser diagnostics on spray-wall interaction, low temperature combustion and pollutant formation under PPC mode.

◇ Combustion and Nano soot particle CFD simulation.

◆ **Gasoline direct injection (GDI) engine.** Ph.D. student, Tianjin University, China. June.2011~June.2015.

National Natural Science Foundation of China "Study on the soot particle formation mechanism and emission characteristics of the GDI engine".

◇ Independently designed a PAHs sampling device and obtained an invention patent in China.

◇ Developed a TRF-PAHs mechanism that can be used to predict in-cylinder combustion process.

◆ **Atkinson engine.** Ph.D. student, Tianjin University, China. June.2012~Nov.2014.

◇ 1.5L Atkinson engine thermodynamics development of Guangzhou Automobile Group Co., Ltd.

◇ 863 Program of China "Development of 1.6L high compression ratio Atkinson engine combustion system".

◆ **Engine performance benchmarking.** Ph.D. student, Tianjin University, China. May.2011~July.2012

◇ Completed Roewe 550 1.8T, Tiida 1.6T SI and Karry 1.0T CI engines.

◆ **Spray experiments of Diesel-Gasoline blend fuel.** Tianjin University, China.Sep.2010~July.2012

National Natural Science Foundation of China "Basic research on the combustion characteristics of the main components of the vehicle fuel".

◇ Obtained 40 ~240℃, 40 ~ 270℃, 40 ~ 300℃ three distillation range of petroleum fractions.

◇ Used planar laser induced fluorescence (PLIF) method to investigate the spray characteristics under different injection pressure (140-220MPa), ambient density (20-60kg/m^3) and nozzle diameter (0.1-0.18mm).

◆ **CAE Engineer**, Great Wall Motor Company Limited, China. July.2009~Sep.2010

◇ Optimization design and development of CI engine combustion chamber.

PROFESSIONAL ACTIVITIES

China National Scholarship (2008), China's National Inspirational Scholarship (2007).

Hunan Province Outstanding Graduates (2009).

Classic SAE Member

Session Chairman of Particle Emissions from Combustion Sources in PF&L 2017

Reviewers of Applied Energy, Energy, Fuel, Energy Conversion and Management, Energy & Fuel,

Teaching Assistant for Internal Combustion Engine course

Lecturer for Clean Combustion Winter School 2018

RESEARCH INTERERSTS

◆ Laser diagnostic on combustion process and pollution formation.

◆ Chemical kinetics and reaction mechanisms and their applications in advanced engine combustion.

◆ Combustion simulation and optimization for both conventional and renewable fuels.

◆ Numerical study on soot precursors and soot particle formation process.

PUBLISHED PAPERS

(Google Scholar citations 242, h-index 8; 2018.11.19)

1. **Yanzhao An**, Qinglong Tang, R Vallinayagam, Jaeheon Sim, Junseok Chang, Gaetano Magnotti, Bengt Johansson. Combustion stability study of partially premixed combustion with low-octane fuel at low engine load conditions. **Applied Energy**, 2019, 235:56-67.
2. **Yanzhao An**, Qinglong Tang, R Vallinayagam, Jaeheon Sim, Junseok Chang, Gaetano Magnotti, Bengt Johansson. Low load combustion stability study of partially premixed combustion by high pressure multiple injections with low octane fuel. **Applied Energy**, under review.
3. **Yanzhao An**, M. Jaasim, R. Vallinayagam, Francisco Hernández Pérez, H.G. Im, B. Johansson. HCCI and PPC Mode Combustion in Compression Ignition Engine with Low Octane Gasoline. **Energy**, 2018,158:181-191.
4. **Yanzhao An**, M. Jaasim, R. Vallinayagam, S. Vedharaj, H.G. Im, B. Johansson. Numerical simulation of combustion and soot under partially premixed combustion of low-octane gasoline. **Fuel**, 2018,211: 420-431.
5. **Yanzhao An**, M. Jaasim, R. Vallinayagam, H.G. Im, B. Johansson. In-cylinder Combustion and Soot Evolution in the Transition from Conventional CI mode to PPC. **Energy & Fuel**, 2018, 32 (2): 2306-2320.
6. R Vallinayagam, **Yanzhao An***, S Vedharaj, Jaeheon Sim, Junseok Chang, Bengt Johansson. Naphtha vs. dieseline–The effect of fuel properties on combustion homogeneity in transition from CI combustion towards HCCI. **Fuel**, 2018, 224; 451-460.
7. Qinglong Tang, **Yanzhao An***, R Vallinayagam, Jaeheon Sim, Junseok Chang, Bengt Johansson. Experimental Study the Effect of Spray-Wall Interaction under Partially Premixed Combustion mode. **Fuel**, Under review.
8. **Yanzhao An**, Yiqiang Pei, Zhao, Hua, et al. Development of a PAH (polycyclic aromatic hydrocarbon) formation model for gasoline surrogates and its application for GDI (gasoline direct injection) engine CFD (computational fluid dynamics) simulation. **Energy**, 2016. 94: 367-379.
9. **Yanzhao An**, Yiqiang Pei, Zhao, Hua, et al. An experimental study of polycyclic aromatic hydrocarbons and soot emissions from a GDI engine fueled with commercial gasoline. **Fuel**, 2016. 164: 160-171.
10. **Yanzhao An**, Yiqiang Pei, Zhao, Hua, et al. Development of a Soot Particle Model with PAHs as Precursors by Simulation and Experiment. **Fuel**, 2016. 179: 246-257.
11. **Yanzhao An**, Yiqiang Pei, Zhao, Hua, et al. Kinetic modeling of polycyclic aromatic hydrocarbons formation process for gasoline surrogate fuels. **Energy Conversion and Management**, 2015. 100: 249-261.
12. **Yanzhao An**, M. Jaasim, R. Vallinayagam, S. Vedharaj, Francisco Hernandez Perez, Jaeheon Sim, Junseok Chang, Hong Im, Bengt Johansson. Investigation of Premix and Diffusion Flames in PPC and CI Combustion Modes. SAE paper, 2018-01-0899.
13. **Yanzhao An**, M. Jaasim, R Vallinayagam, Abdullah AlRamadan, Jaeheon Sim, Junseok Chang, Hong Im, Bengt Johansson. Compression Ignition of Low Octane Gasoline under Partially Premixed Combustion Mode. SAE paper, 2018-01-1797.
14. **Yanzhao An**, R. Vallinayagam, S. Vedharaj, Jean-Baptiste Masurier, Mohammad Izadi Najafabadi, Bart Somers, Bengt Johansson. In-cylinder visualization and engine out emissions from CI to PPC for fuels with different properties. The Ninth International Conference on Modeling and Diagnostics for Advanced Engine Systems (COMODIA 2017), July 25-28, 2017, Okayama, Japan.
15. **Yanzhao An**, R. Vallinayagam, S. Vedharaj, Alaaeldin Dawood, Jean-Baptiste Masurier, Mohammad Izadi Najafabadi, Bart Somers, Bengt Johansson. Analysis of transition from HCCI to CI via PPC with low octane gasoline fuels using optical diagnostics and soot particle analysis. SAE paper, 2017-01-2403.
16. **Yanzhao An**, R. Vallinayagam, S. Vedharaj, Alaaeldin Dawood, Jean-Baptiste Masurier, Mohammad Izadi Najafabadi, Bart Somers, Bengt Johansson. Effect of Aromatics on Combustion Stratification and Particulate Emissions from surrogate of Naphtha fuels in PPC and HCCI mode. SAE paper, 2017-24-0086.
17. **Yanzhao An**, Yiqiang Pei, Zhao, Hua, et al. Study of polycyclic aromatic hydrocarbons evolution processing in GDI engines using TRF-PAH chemical kinetic mechanism. SAE paper, 2016-01-0690.
18. R Vallinayagam, S Vedharaj, **Yanzhao An**, Alaaeldin Dawood, Mohammad Izadi Najafabadi, Bart Somers, Bengt Johansson. Combustion Stratification for Naphtha from CI Combustion to PPC. SAE paper, 2017-01-0745.
19. R Vallinayagam, S Vedharaj, **Yanzhao An**, Alaaeldin Dawood, Mohammad Izadi Najafabadi, Bart Somers, Bengt Johansson. Compression ignition of light naphtha and its multicomponent surrogate under partially premixed conditions. SAE paper, 2017-24-0078.

20. S Vedharaj, R Vallinayagam, **Yanzhao An**, Alaaeldin Dawood, Mohammad Izadi Najafabadi, Bart Somers, Bengt Johansson. Fuel effect on combustion stratification in partially premixed combustion. SAE paper, 2017-24-0089.
21. S Vedharaj, R Vallinayagam, **Yanzhao An**, Mohammad Izadi Najafabadi, Bart Somers, Junseok Chang, Bengt Johansson. Combustion homogeneity and emission analysis during the transition from CI to HCCI for FACE I gasoline. SAE paper, 2017-24-2263.
22. R. Vallinayagam, Abdullah S. AlRamadan, S. Vedharaj, **Yanzhao An**, Jaeheon Sim, Junseok Chang, Bengt Johansson. Low Load Limit Extension for Gasoline Compression Ignition using Negative Valve Overlap strategy. SAE paper, 2018-01-0896.
23. **Yanzhao An**, Haozhong Huang, Wanhua Su, et al. 燃油属性和环境密度对柴油机混合燃料喷雾的影响. 内燃机学报, 2013, 31(2) 103-108.
24. Haozhong Huang, **Yanzhao An**, Wanhua Su, et al. 喷射压力和喷孔直径对柴油机混合燃料喷雾特性的影响. 内燃机学报, 2013, 31(3) 200-207.
25. **Yanzhao An**, Haozhong Huang, Yiqiang Pei, et al. 车用柴油机燃油喷雾的研究发展. 小型内燃机与摩托车, 2012, 41(5) 87-92.
26. Shengping Teng, Yiqiang Pei, **Yanzhao An**, Zehnping Wang, Xianghong Nie, Sisi Ji. 缸内直喷汽油机多环芳烃排放特性的试验研究, 环境科学学报, 36 (11) 3929-3937.
27. Yuli Dai, Yiqiang Pei, Jing Qin, Jianye Zhang, **Yanzhao An**. 煤制油的喷雾及燃烧排放性能试验研究. 内燃机工程, 2015, 36(3) 26-32.