

Curriculum Vitae

Prof. Ahmad Abu Jrai

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Curriculum Vitae

Personal Information

Full Name: Ahmad Mohammed Khaleel Abu Jrai

Academic Position and rank: Full Professor
(Ph.D. in Mechanical Engineering)

Address: Department of Mechanical Engineering
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Nationality: Jordanian

Date and place of birth: 5th October 1977, Saudi Arabia

Education

2004 – 2007:

Ph.D. Degree in Mechanical Engineering
Mechanical and Manufacturing Engineering Department
Engineering school
University of Birmingham
United Kingdom.

2000 – 2002:

M.Sc. Degree in Mechanical Engineering, average of
3.94 out of 4.00 rating (Excellent)
Mechanical Engineering Department
Faculty of Engineering and Technology
University of Jordan
Amman – Jordan

1995 – 2000:

B.Sc. Degree in Mechanical Engineering, average of
3.15 out of 4.00 rating (very good)
Mechanical Engineering Department
Faculty of Engineering and Technology
University of Jordan
Amman – Jordan

1994 – 1995:

General Secondary Degree, Scientific Stream
Percentage average 91.6
Ma'an Secondary school
Ma'an, – Jordan.

Doctoral Program

P.hD. Specific Field:

Internal Combustion Engines and Air Pollution
(Selective Catalytic Reduction of Diesel Emissions)

Thesis Title:

Control of Diesel Engine NO_x Emissions by Selective Catalytic Reduction and Exhaust Gas-Assisted Fuel Reforming

***Thesis Contribution
and Field Weight:***

Concerns over global warming has in recent years led to international government and industry efforts being focused on the reduction of emissions of greenhouse gases. In the area of automotive transport, the interest in more fuel-efficient technologies to achieve better fuel economy and reduce CO₂ emission has been fundamental to the increasing popularity of the diesel passenger car. The main aim of the work was to study and improve the low temperature hydrocarbon selective catalytic reduction (HC-SCR) of NO_x. The exhaust gas-assisted fuel reforming has been also studied as a way to improve the performance of SCR process by providing H₂-rich reformat gas.

Work Experience

Jun. 2018 – Present:

Member of board of trustees at The Hashemite University
The Hashemite University
Al-Zarqa – Jordan.

May. 2017 – Present:

Full Professor
Department of Mechanical Engineering
Department of Environmental Engineering
Faculty of Engineering
Al-Hussein Bin Talal University
Ma'an – Jordan.

Sep. 2014 – Present:

Chairman of Admission and Registration Unit
Al-Hussein Bin Talal University

Aug. 2013 – July 2014

Fulbright visiting scholar
Department of Mechanical and Aerospace Engineering
Faculty of Engineering
West Virginia University
Morgantown – USA

Jan. 2012 – Present:

Associate Professor
Department of Mechanical Engineering
Department of Environmental Engineering
Faculty of Engineering
Al-Hussein Bin Talal University
Ma'an – Jordan.

May 2007 – Jan 2012:

Assistant Professor
Department of Environmental Engineering
Faculty of Engineering
Al-Hussein Bin Talal University
Ma'an – Jordan.

Nov. 2009 – Sept. 2010:

Vice Dean
Studentship Affairs
Al-Hussein Bin Talal University
Ma'an – Jordan.

Sept. 2008 –Sept. 2010:

Chairman of Environmental Engineering Department
Faculty of Engineering
Al-Hussein Bin Talal University
Ma'an – Jordan.

Feb. 2004 – May 2007:

Teaching Assistant “Small group teaching for
Refrigeration and Air conditioning courses”
Mechanical and Manufacturing Engineering Department
Engineering school
University of Birmingham
United Kingdom.

Feb. 2004 – May 2007:

Teaching Assistant and demonstration work for (Heat
and mass transfer, Refrigeration and air conditioning,
Fluid mechanics, Thermodynamics) laboratories.
Mechanical and Manufacturing Engineering Department
Engineering school
University of Birmingham
United Kingdom.

Feb. 2001 – June 2002:

Research Assistant
Mechanical Engineering Department
Faculty of Engineering and Technology
University of Jordan
Amman – Jordan

June 2000 – June 2002:

Teaching Assistant for (Heat transfer, Power plants, Modern Control, and Internal Combustion Engines) courses.

Mechanical Engineering Department
Faculty of Engineering and Technology
University of Jordan
Amman – Jordan

June 2000 – June 2002:

Teaching Assistant and demonstration work for (Fluid mechanics and Thermodynamics) laboratories.

Mechanical Engineering Department
Faculty of Engineering and Technology
University of Jordan
Amman – Jordan

Awards and Honours

❖ 2007, AUSTIN ROVER Prize

Training and Courses

Feb. 2005:

Technical Paper and Report Writing
Engineering school
University of Birmingham
United Kingdom

April 2004 – May 2004:

Comprehensive course in Education Skills
Education School
University of Birmingham
United Kingdom

April 2004:

Laboratory Demonstration
Engineering school
University of Birmingham
United Kingdom

Feb. 2004:

Engineering Safety
Engineering school
University of Birmingham
United Kingdom

July 1999 – Sept. 1999:

Practical engineering training, “fluid mechanics and
laser techniques”
University of Friberg
Germany.

Taught Courses:

Introduction to Environmental Engineering.
Environmental Issues.
Materials Science and Engineering.
Air Pollution.
Solar Engineering Technologies.
Statics.

Numerical Methods.
Environmental Legislations.
Solid Waste Management.
Control of Air Pollution.
Internal combustion Engines.
Dynamics.

Current Research Interests

1. Future internal combustion engine as a thermochemical system
2. Effect of reformed gases on the selective catalytic reduction of diesel emissions (mainly NO_x)
3. Environmental catalysts and catalytic systems
4. Combustion and emission control
5. Hydrogen reforming
6. Alternative fuels (Biofuels)
7. Spray laser diagnostics

Research Activities

July 2017:

Member of the Scientific and Technical Committee of the 4th International Conference on Energy and Environment Research (ICEER 2017).

Porto, Portugal

June 2015– Sep 2015:

Scientific research visit

Spray laser diagnostics

Institute of Thermodynamics

Friedrich Alexander University

Erlangen, Germany

Aug. 2013 – July 2014

Fulbright visiting scholar
Scientific research visit
"Diesel fuel exhaust gas-reformer for on-board H₂ production to improve the HC-SCR catalyst NO_x reduction activity and performance of the combustion process".
Department of Mechanical and Aerospace Engineering
Faculty of Engineering
West Virginia University
Morgantown – USA

June 2012– Aug 2012:

Scientific research visit
Spray laser diagnostics
Institute of Thermodynamics
Friedrich Alexander University
Erlangen, Germany

June 2011 – July 2011:

Scientific research visit
"Reaction chain study of spray and combustion processes for direct injection spark ignition (DISI) engines (Spray laser diagnostics)"
Institute of Thermodynamics
Friedrich Alexander University
Erlangen, Germany

May 2009- Present:

External Examiner for Ph.D. theses
External Examiner for MSc. theses
University of Jordan, Jordan
University of Birmingham, UK
Friedrich Alexander University, Germany

June 2009 – Aug 2009:

Scientific research visit
“Hydrogen combustion (optical technique)”
Institute of Thermodynamics
Friedrich Alexander University
Erlangen, Germany

June 2008 – Aug 2008:

Scientific research visit
“Adiabatic premixed combustion in a porous inert media
under high pressure and temperature“
Institute of Fluid mechanics
Friedrich Alexander University
Erlangen, Germany

2017 – Present:

Reviewer for Journal of Energies

2017 – Present:

Reviewer for Chemical Engineering Journal

2011 – Present:

Reviewer for International Journal of Hydrogen Energy

2010 – Present:

Reviewer for Fuel Journal

2010 – Present:

Reviewer for Energy and Fuel Journal

2008 – Present:

Reviewer for Energy Conversion and Management
Journal

International Projects

April 2015 – June 2017:

Team member of the Mediterranean partner (Al-Hussein Bin Talal University) in *eQTeL* Project "Enhancing Quality of Technology-Enhanced Learning at Jordanian Universities" which is approved by the European Commission within the framework of the TEMPUS program; the wider objective of the project is to promote reform of higher education in Jordan through the introduction of national quality assurance system for technology-enhanced learning.
Princess Sumaya University for Technology
Jordan

Sep 2009 – Sep 2010:

Representative of the Mediterranean partner (Al-Hussein Bin Talal University) in *SERMANTEQ* Project, which is funded by the European Commission within the framework of the TEMPUS program; the purpose of this project is to modernize the curricula of higher education by creating new programs or courses, and to increase service capabilities for students by promoting openness towards society.

Grenoble University - France

Funded Scientific Research Projects

- Biodiesel production from waste cooking oil: yield and environmental aspects (\$ 15000) Al-Hussein Bin Talal University (Scientific Research Support Fund), 2008.
- Combustion characteristics and engine emissions for diesel engine fitted with REGR and fueled with biodiesel blends (\$ 200000) Ministry of Higher Education (Scientific Research Support Fund), 2009.

Memberships

- 1- Jordan Engineers Association, Jordan
- 2- Jordan Environment Society, Jordan
- 3- Society of Automotive Engineers, USA
- 4- American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), USA.

List of publications

1. Published journal papers

1. Hasan A. , Al-Rawashdeha H. , Al-Muhtaseb A., **Abu-Jrai A.** , Ahmad R., Zeaiterd J." Impact of changing combustion chamber geometry on emissions, and combustion characteristics of a single cylinder SI (spark ignition) engine fueled with ethanol/gasoline blends". *Fuel*, vol. 231, pp 197-203, **2018**.
2. Hasan A., Elghawia U., Al-Muhtaseb A., **Abu-Jrai A.**, Al-Rawashdeh H., Tsolakis A. "Influence of composite after-treatment catalyst on particle-bound polycyclic aromatic hydrocarbons–vapor-phase emitted from modern advanced GDI engines". *Fuel*, vol. 222, pp 424-433, **2018**.
3. Hasan A., **Abu Jrai A.**, Al-Muhtaseb A., Jamil F. "Impact of EGR and engine speed on HCCI engine performance and tail pipe emissions". *Energy Procedia*, Vol. 136, pp. 208-212, **2017**.
4. Al-Khashman O., Alnawafleh H., **Abu Jrai A.**, Al-Muhtaseb A. "Monitoring and Assessing of Spring Water Quality in Southwestern Basin of Jordan". *Open Journal of Modern Hydrology*, Vol. 7, pp. 331-349, **2017**.
5. Jamil F., Saxena S., Al-Muhtaseb A., Baawain M., Al-Abri M., Viswanadham N., Kumar G., **Abu-Jrai A.**"Valorization of waste “date seeds” bio-glycerol for synthesizing oxidative green fuel additive". *Journal of Cleaner Production*, vol. 165, pp 1090-1096, **2017**.
6. **Abu Jrai A.**, Jamil F., Al-Muhtaseb A., Baawain M., Al-Haj L., Al-Hinai M., Al-Abri M., Rafiq S."Valorization of waste Date pits biomass for biodiesel production in presence of green carbon catalyst". *Energy Conversion and Management*, vol. 135, pp 236-243, **2017**.
7. **Abu-Jrai A.**, Al-Muhtaseb A., Hasan A.."Combustion, performance, and selective catalytic reduction of NO_x for a diesel engine operated with combined tri fuel (H₂, CH₄, and conventional diesel)". *Energy*, vol. 119, pp 901-910, **2017**.
8. Hasan A., **Abu Jrai A.**, Al-Muhtaseb A., Tsolakis A., Hongming X. “Formaldehyde, acetaldehyde and other aldehyde emissions from HCCI/SI gasoline engine equipped with prototype catalyst”. *Fuel*, vol. 175, pp 249-256, **2016**.
9. Hasan A., **Abu Jrai A.**, Al-Muhtaseb A., Tsolakis A., Hongming X. “HC, CO and NO_x emissions reduction efficiency of a prototype catalyst in gasoline bi-mode SI/HCCI engine”. *Journal of Environmental Chemical Engineering*, vol. 4, pp 2410-2416, **2016**.
10. Hasan A., **Abu Jrai A.**, Turner D., Tsolakis A., Golunski S., Herreros J. “Control of harmful hydrocarbon species in the exhaust of modern advanced GDI engines”. *Atmospheric Environment*, vol. 129, pp 210-217, **2016**.

11. Hasan A., **Abu Jrai A.**, "Emissions Reduction of Regulated and Unregulated Hydrocarbon, Gases in Gasoline Bi-mode SI/HCCI Engine by TWC Converter". *Journal of Applied Mechanical Engineering*, ISSN:2168-9873, 2016.
12. Al-Samari A., Clark N., **Abu-Jrai Ahmad** "Look-ahead model for hybrid truck fuel economy improvement, standard and real word driving cycles' condition" *Diyala Journal for Engineering Sciences*, vol. 8, pp 641-656, 2015.
13. **Abu-Jrai A.**, Jehad A. Yamin etl "NO_x removal efficiency and N₂ selectivity during selective catalytic reduction processes over Al₂O₃ supported highly cross-linked polyethylene catalysts" *Journal of Industrial and Engineering Chemistry*, vol. 20, pp 1650-1655, 2014.
14. Malek Alkasrawi , **Ahmad Abu-Jrai**, Ala'a H. Al-Muhtaseb "Simultaneous saccharification and fermentation process for ethanol production from steam-pretreated softwood: Recirculation of condensate streams" *Chemical Engineering Journal*, vol. 225, pp 574-579, 2013.
15. **Abu-Jrai A.**, Yamin J., Al-Muhtaseb A., Hararah M. "Combustion characteristics and engine emissions of a diesel engine fueled with diesel and treated waste cooking oil blends". *Chemical Engineering Journal*, vol. 172, pp 129-136, 2011.
16. Bakry A., Al-Salaymeh A., Al-Muhtaseb A., **Abu-Jrai A.**, Trimis D. "Adiabatic premixed combustion in a gaseous fuel porous inert media under high pressure and temperature: Novel flame stabilization technique". *Fuel*, vol.. 90, pp 647-658, 2011.
17. Bakry A., Al-Salaymeh A., Al-Muhtaseb Ala H., **Abu-Jrai A.**, Trimis D. "CO and NO_x emissions in porous inert media (PIM) burner system operated under elevated pressure and inlet temperature using a new flame stabilization technique". *Chemical Engineering Journal*, vol. 165, pp 589-596, 2010.
18. Tsolakis A., Torbati R., Megaritis A., **Abu-Jrai A.**, "Low load dual fuel CI engine operation with on-board reformer and diesel oxidation catalyst; Effects on engine performance and emissions". *Energy & Fuels*, vol. 24, pp. 302-308, 2010.
19. Bakry A., Al-Salaymeh A., Al-Muhtaseb A., **Abu-Jrai A.**, Trimis D., Durst F. "Low-Emission Premixed Porous Inert Media (PIM) Burner System Fueled with Vegetable (Rapeseed) Oil Using a Flow Velocity Flame Stabilization Technique". *Energy & Fuels*, vol.. 24, pp 288-294, 2010.

20. **Abu-Jrai A.**, J. Rodríguez-Fernández, A. Tsolakis, A. Megaritis, K. Theinnoi, R.F. Cracknell, R.H. Clark "Performance, combustion and emissions of a diesel engine operated with reformed EGR. Comparison of diesel and GTL fuelling". *Fuel*, vol.. 88, pp 1031-1041, **2009**.
21. **Abu-Jrai A.**, Tsolakis A., Theinnoi K. Megaritis A. Golunski S. "Diesel exhaust-gas reforming for H₂ addition to an aftertreatment unit". *Chemical Engineering Journal*, vol. 141, pp. 290-297, **2008**.
22. **Abu-Jrai A.**, Tsolakis A. Megaritis A. "The influence of H₂ and CO on diesel engine combustion characteristics, exhaust gas emissions, and aftertreatment selective catalytic NO_x reduction". *International Journal of Hydrogen Energy*, vol. 32, pp. 3565- 3571, **2007**.
23. **Abu-Jrai A.**, Tsolakis A. "The effect of H₂ and CO on the selective catalytic reduction of NO_x under real diesel engine exhaust conditions over Pt/Al₂O₃". *International Journal of Hydrogen Energy*, vol. 32, pp. 2073- 2080, **2007**.
24. **Abu-Jrai A.**, Tsolakis A., Theinnoi K., Cracknell R., Megaritis A., Wyszynski M., Golunski S. "Effect of GTL diesel fuels on combustion characteristics, engine emissions, and exhaust gas fuel reforming. "Comparative Study". *Energy & Fuels* vol. 20, pp. 2377-2384, **2006**.

2. Conferences and SAE papers

1. **Abu Jrai A.**, Jamil F., Al-Muhateb A., Baawain M., Al-Abri M. "Phoenix dactylifera L. kernel oil as a source for fatty acid methyl esters". *The 2nd International Conference on Alternative Fuels and Energy: Future and Challenges – ICAFE 2017, At Daegu, South Korea, 2017*.
2. Al-Muhtaseb A. , Jamil F., Baawain M., Al-Hinai M., **Abu-Jrai A.**, "Synthesis of mesoporous carbon material from waste " Date seeds " and its application for " tertiary butylation " of phenol". *International Congress on Water, Waste and Energy Management., At Rome-Italy, 2016*.

3. Hasan A. O., **Abu-Jrai A.** “Emissions Reduction Of HC, CO and NO_x Gases in Gasoline bi-mode SI/HCCI Engine by TWC Converter ”. *International conference on chemical and biochemical engineering, At Paris-France, 2015.*
4. Tsolakis A., **Abu-Jrai A.**, Theinnoi K., Wyszynski M., Xu H., Megaritis A., Cracknell R., Golunski S., Peucheret S. “Exhaust gas fuel reforming for IC Engines using diesel type fuels” JSAE Paper No. 20077170, *SAE* No. 2007-01-2044, **2007.**
5. Tsolakis A., Megaritis, A. Yap D., **Abu-Jrai A.** “Combustion characteristics and exhaust gas emissions of diesel engine supplied with Reformed EGR” *SAE* Paper No. 2005-01-2087, **2005.**