Dr. Ahmed Elwardany

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Research Impact	h-index – Scopus: 27 and 2175 citations

Biography

Dr. Elwardany received his BSc and MSc from the mechanical engineering department, Faculty of Engineering, Alexandria University at Egypt in 2005 and 2009, respectively. He, then, moved to UK in June 2009 and obtained his PhD in March 2012 from the Centre for Automotive Engineering, University of Brighton, UK (under the supervision of **Prof. Sergei Sazhin**). He also worked there as a post-doctoral fellow for six months (to the end of a project) in **University of Brighton**, UK. His main research was focusing on modeling heating and evaporation of multi-component fuels for spray applications. In July 2012, he joined, as a post-doctoral fellow, the Clean Combustion Research Centre in King Abdullah University of Science and Technology (**KAUST**), Saudi Arabia. He was in charge of measuring kinetics targets (ignition delay times, species time-histories and reaction rates). He, also, spent more than one year in Computational Reacting Flow Laboratory (CRFL) with **Prof. Hong Im** in KAUST. His role was focusing on modeling of low grade and alternative fuels, spray and combustion. In 2015, he became an assistant professor in mechanical engineering department, Alexandria University, Egypt. In September 2018, he moved to Egypt-Japan University of Science and Technology (E-JUST) to lead Fuels and Combustion Engines Laboratory. In October 2023, He moved to Sultan Qaboos University and joined the Department of Mechanical & Industrial Engineering as associate Professor.

Regarding his teaching experience, Dr. Elwardany spent several years teaching both under-graduate and graduate courses. This includes thermo-fluids, thermodynamics, cogeneration systems, fuels and combustion, internal combustion engines, Diesel combustion, gas dynamics, gas turbines, introduction to energy, advanced fuels and **c**ombustion, and automotive engineering in E-JUST, Alexandria university and AASTMT. This comes with UG and PG seminar courses with project based learning courses. He also was in charge in rephrasing/accreditation of the bylaws of the mechanical engineering department (Alexandria University) in a credit-hours based system.

Education

Degree	Specialization	Institution	Year
PhD	Mechanical Engineering	University of Brighton, UK	2012
MSc	Mechanical Engineering	Alexandria University, Egypt	2009
BSc	Mechanical Engineering	Alexandria University, Egypt	2005

Theses

Degree	Title	Institution	Month -Year
PhD	Modelling of multi-component fuel droplet heating and evaporation	University of Brighton, UK	March - 2012
MSc	Modeling of heat, mass transfer and breakup processes in diesel fuel droplets	Alexandria University, Egypt	February - 2009

Academic Rank

Rank	Month - Year
Associate Professor	November- 2020
Assistant Professor	November- 2015

Academic Experience

Organization	Designation	Period
Associate Professor	Sultan Qaboos University	October 2023 - Present
Associate/Assistant Professor	Alexandria University, E-JUST	November 2015 – September
Postdoctoral Fellow	King Abdullah University of Science and Technology (KAUST)	July 2012 – July 2015
Research Officer	University of Brighton	January 2012 – June 2012
Demonstrator	Alexandria University	September 2005 – May 2009

Grants – Principal Investigator PI

	Funding Agency	Title	Amount - Status
8	**Internal Grant**	Experimental Investigation on Co-Combustion of Methane/Hydrogen Mixtures in a Flameless Combustor	7,700 OMR - Running
7	**Deanship of Research**	Effects of swirl and tumble on methane combustion: toward cleaner burning	3,000 OMR - Running
6	**STDF (Governmental)**	STDF 46447: Utilization of Ammonia for Mobility Decarbonization	2,496,660 LE - Running
5	**STDF (Governmental)**	STDF 43667: Producing Carbon Nanotubes Like-materials from Diesel Engine Exhaust: Environment-friendly Added Value	1,330,520 LE - Running
4	**ASRT (Governmental)**	A Combined Fuel and Power (CFP) production System from Agri-food Industry Wastes: Design, Fabrication and Testing	775,000 LE – Completed Aug 2023
3	**STDF (Governmental)**	STDF 39410: A Novel Combined Gasifier/Carbonization Reactor for Production of Biogas and Biochar	100,000 LE – Completed Sept 2020
2	**SARAYA Company**	Jojoba oil to base lubrication oil	10,000 USD, Running
1	**Unilever Tea Factory**	Carbonization and Graphitization Processes of Unilever's Tea Factory Waste: Characterization and Optimization	23,700 LE, Completed Sept 2020

Professional Activities

Designation	Details	Year
Associate Editor	Alexandria Engineering Journal (Q1) - ELSEVIER	2019 - Present
Organizing Committee	Local Committee - 13th Mediterranean Combustion Symposium CS conference held in Luxor	January 2023
Organizing Committee	2nd – 4th International Conference of Chemical, Energy and Environmental Engineering	2019 - 2023
Reviewer	FUEL, ENERGY, RENEWABLE ENERGY, BIOMASS CONVERSION and BIOREFINERY, ENERGY & FUELS, Int Journal of HEAT and MASS TRANSFER, Int Journal of HYDROGEN ENERGY	2012 - Present
Attending Conferences	9th – 13th MCS in Turkey, Italy, Greece, Spain and Egypt International Combustion Symposium in San Francisco, USA	2013 - 2023

Main supervisor – Current Students

#	Degree - Student Name	Thesis Title	Enrolment Date
9	PhD -Salim Al Hamadani	Co-combustion of hydrogen/methane under MILD combustion conditions	Fall 2024
8	PhD – Ehab Rashed	Numerical and Experimental Investigations of Co-combustion of Different Fuels	Spring 2022
7	MSc – Margret Kuteesa	Experimental investigation of a gaseous fuel burner: effect of design and operation parameters on burner performance and Emissions	Spring 2022
6	PhD – Mohamed Khairy	Experimental investigation on continuous feed of biomass in torrefaction reactor	Spring 2021
5	PhD - Mohamad Alashmawy	Numerical and Experimental Study for Enhancing Production of Producer Gas from Gasification Reactor	Spring 2021
4	PhD – Hesham Elkady	Experimental Investigation on evaporation of fuel droplet with additives	Spring 2021
3	PhD - Shadrack Musyoka	Investigating the effect of functional groups of esters/ethers/alcohols on performance, emissions and soot nanostructure of a compression ignition engine	Spring 2021
2	PhD - Mohamed Khidr	Optimization of performance of diesel engine running with nanoparticles/biodiesel/diesel fuel blends	Spring 2021
1	PhD - Mohamed Almanzalawy	Experimental Investigation on the Effect of Carbonyl group-based Compounds on Operating Characteristics of Diesel Engine and Soot Nanostructure	Spring 2021

Main supervisor – Graduated Students

#	Degree - Student Name	Thesis Title	Graduation year
9	PhD – Mahmoud Amer	Optimization, chemical kinetics and a novel combined gasification/carbonization reactor for biomass	2021
8	PhD – Yousef Bello	Effect of air distributor design in the fluidized bed reactor on the production of syngas with its utilization in compression ignition engines	2021
7	MSc – Mariam Yehia	Numerical Investigation on Biomass Gasification	2022
6	MSc – Amr Sanad	Biochar Production Through Carbonization of Water Hyacinth and its Application as a Fuel Additive	2022
5	MSc - Amr Mamdouh	Experimental investigation of the effect of different metal oxides nanoparticles as additives on compression ignition engines	2020
4	MSc - Osama Elsaid	A combined effect of stoichiometric-oxygen-hydrogen gas and alumina nanoparticles on ci engine operating characteristics	2021

Research Interests

- ✓ Carbon neutral-, Alternative and Low-Grade Fuels
- ✓ Morphology and Nanostructure of Soot
- ✓ Spray and Liquid Atomization
- ✓ Droplet Heating and Evaporation
- ✓ Combustion engines processes simulations using CONVERGE and ANSYS
- ✓ Biomass Gasification and Carbonization
- ✓ Gasification simulations using MFIX and ANSYS
- ✓ Nanoparticles Synthesis using CI engines and Flames

Committees

Name	Description	Period
Secretary Office on the BOT	Member	2020 - 2022
University Ranking	Member	2020 - Present
Laboratory Safety	Member	2022 - Present
Top Management Visit to Japan	Member	January 2019

Teaching – Courses (2015 – Present)

Undergraduate Course title	Number of times taught	Postgraduate Course title	Number of times taught
Thermo-fluids	5	Advanced Thermodynamics	4
Thermodynamics	5	Thermal and Cogeneration Systems	4
Gas dynamics	4	Advanced Fuel and Combustion	4
Measurements	6	Measurements in Combustion	2
Combustion and Engines	8		
Automotive Engineering	4		
Tubomachinery	1		
Numerical Methods for Engineers	1		

No. of students as an academic advisor: 25 per semester for 8 years
No. of supervised FYP/Senior Design Projects: 12
No. of students supervised in FYP/Senior Design projects: 60+

Awards

Name	Details	Year
Millionaire Club	2 times by E-JUST for getting projects with more than 1 million EGP budget	2022 and 2023
Post-doctoral Poster Competition	2nd Prize in the Post-doctoral Poster Competition held in KAUST Jan 2014 during the Winter Enrichment Program	2014
PETA award for young researchers	from ILASS-Europe 2011, Estoril, Portugal, 5-7 September 2011.	2011

Consultations

- ✓ **1-3 2020: Unilever Lipton, thermal camera imaging for the packaging process to define the source of malfunction in the packaging process.**
- ✓ **3-8 2018 National Cement Factory: Evaluation of the Energy Efficiency of the factory and its main components. This also included providing different energy scenarios for the factory assuming different fuels for the kiln.**
- ✓ **1-2 2018: determination of fuel consumption of Vestia Company for clothes.**

Publications

1. Almanzalawy, M., Nada, S., **Elwardany, A.** and Elkady, M., 2024. Enhancing diesel engine performance and carbon nanotube yield using high alcohols and ferrocene. *Chemical Engineering Science*, p.120964.
2. Almanzalawy, M.S., Elkady, M.F., Sanad, A., Yousef, M. and **Elwardany, A.E.**, 2024. Combined effects of ferric oxide nanoparticles and C2–C4 alcohols with diesel/biodiesel blend on diesel engine operating characteristics. *Alexandria Engineering Journal*, *103*, pp.38-50.
3. Khairy, M., Amer, M., Ibrahim, M., Ookawara, S., Sekiguchi, H. and **Elwardany, A.**, 2024. The influence of torrefaction on the biochar characteristics produced from sesame stalks and bean husk. *Biomass Conversion and Biorefinery*, *14*(15), pp.17127-17148.
4. Rashed, E.S., **Elwardany, A.E.**, Emam, M., Abo-Elfadl, S., Mori, S. and Hassan, H., 2024. 3D numerical study of NH3/H2 MILD combustion in a reversed flow MILD combustion furnace. *Applied Thermal Engineering*, p.123610.
5. Khidr, M., Hassan, H., Megahed, T., Ookawara, S. and **Elwardany, A.**, 2024. Effect of

water-emulsive biodiesel/diesel blend with alumina nanoparticles on diesel engine performance and emissions: experiments and optimization. *Process Safety and Environmental Protection*, *186*, pp.10-24.

6. Aboud, L.M., Almanzalawy, M.S., Elbatran, A.A., Tawfik, A.A. and **Elwardany, A.E.,** 2024. On the influence of low octane gasoline and biodiesel on diesel engine operating characteristics. *Petroleum Science and Technology*, *42*(9), pp.1064-1081.
7. Almanzalawy, M.S., Mori, S., Elkady, M.F. and **Elwardany, A.E., 2024**. Enhancement of energy, exergy and soot characteristics with the utilization of MEK in diesel engine. *Journal of Thermal Analysis and Calorimetry*, *149*(1), pp.463-478.
8. Musyoka, S.K., Khalil, A.S., Ookawara, S.A. and **Elwardany, A.E.**, 2023. Investigating C3 and C4 esters and alcohols in a diesel engine: Combined influence of carbon chain length, oxyfuel type, and oxygen content. Process Safety and Environmental Protection. Volume 180, 475-486.
9. Elkady, H., Zewail, R., Mori, S., Ookawara, S. and **Elwardany, A.E.**, 2023. Methanol, ethanol and propanol droplets evaporation characteristics with dilute concentrations of hematite and magnetite nanoparticles. Petroleum Science and Technology, pp.1-20.
10. Almanzalawy, M.S., Elkady, M.F., Mori, S. and **Elwardany, A.E.,** 2023. Quantification of soot nanostructure produced from a diesel engine fueled with C3 ketone. Energy, 278, p.127790.
11. Musyoka, S.K., Khalil, A.S., Ookawara, S.A. and **Elwardany, A.E.,** 2023. Effect of C4 alcohol and ester as fuel additives on diesel engine operating characteristics. Fuel, 341, p.127656.
12. Khidr, M.E., Megahed, T.F., Ookawara, S. and **Elwardany, A.E.**, 2023. Effects of aluminum and copper oxides nanoparticles as fuel additives on diesel engine operating characteristics. Atmospheric Pollution Research, 14(4), p.101721.
13. Alashmawy, M.M., Hassan, H.S., Ookawara, S.A. and **Elwardany, A.E.**, 2023. Thermal decomposition characteristics and study of the reaction kinetics of tea-waste. Biomass Conversion and Biorefinery, pp.1-19.
14. Khairy, M., Amer, M., Ibrahim, M., Ookawara, S., Sekiguchi, H. and **Elwardany, A.**, 2023. The influence of torrefaction on the biochar characteristics produced from sesame stalks and bean husk. Biomass Conversion and Biorefinery, pp.1-22.
15. Almanzalawy, M.S., Elkady, M.F., Mori, S. and **Elwardany, A.E.,** The role of acetone for cleaner combustion in diesel engine. **Process Safety and Environmental Protection (2023),** Volume 170, Pages 886-897
16. Bello, Y.H., Ahmed, M.A., Ookawara, S. and **Elwardany, A.E.,** *Numerical and experimental investigation on air distributor design of fluidized bed reactor of sawdust pyrolysis*. **Energy (2022)**, 239, p.122179.
17. Amer, M., Brachi, P., Ruoppolo, G., El-Sharkawy, I., Ahmed, M., Ookawara, S. and **Elwardany, A.,** Pyrolysis and combustion kinetics of thermally treated globe artichoke leaves. **Energy Conversion and Management (2021),** 246, p.114656.
18. Al Qubeissi, M., Sazhin, S.S., Al-Esawi, N., Kolodnytska, R., Khanal, B., Ghaleeh, M. and **Elwardany, A**., *Heating and Evaporation of Droplets of Multicomponent and Blended Fuels: A Review of Recent Modeling Approaches*. **Energy & Fuels (2021)**, 35(22), pp.18220-18256.
19. Saad, A.S., **Elwardany, A.**, El-Sharkawy, I.I., Ookawara, S. and Ahmed, M., 2021. *Performance evaluation of a novel vertical axis wind turbine using twisted blades in multi-*

stage Savonius rotors. **Energy Conversion and Management (2021)**, 235, p.114013.

20. **Elwardany, A.E.,** Abouarida, O.E. and Abdel-Rahman, A.A., 2021. *A combined effect of stoichiometric-oxygen-hydrogen gas and alumina nanoparticles on CI engine operating characteristics*. **Fuel (2021)**, 296, p.120705.

21. Kabil, I., Al Qubeissi, M., Badra, J., Abdelghaffar, W., Eldrainy, Y., Sazhin, S.S., Im, H.G. and **Elwardany, A**., 2021. An improved prediction of pre-combustion processes, using the discrete multicomponent model. **Sustainability (2021)**, 13(5), p.2937.

22. **A.E. Elwardany**, M.N. Marei, Y. Eldrainy, R.M. Ali, M. Ismail and M.M. El-Kassaby, *Improving performance and emissions characteristics of compression ignition engine: Effect of ferrocene nanoparticles to diesel-biodiesel blend*. **Fuel (2020)**, *270*, p.117574.

23. M.K. Ashour, and **A.E. Elwardany**, *Addition of two kerosene-based fuels to diesel–biodiesel fuel: Effect on combustion, performance and emissions characteristics of CI engine*. **Fuel (2020)**, 269, p.117473.

24. Y.H. Bello, S.A. Ookawara, M.A. Ahmed, , M.A. El-Khouly, , I.M. Elmehasseb, , N.M. El-Shafai, and **A.E. Elwardany**, *Investigating the engine performance, emissions and soot characteristics of CI engine 8ndustr with diesel fuel loaded with graphene oxide-titanium dioxide nanocomposites*. **Fuel (2020),** *269*, p.117436.

25. A.A. Hassan, **A.E. Elwardany**, S. Ookawara, , M. Ahmed, and I. El-Sharkawy, 2020. *Integrated adsorption-based multigeneration systems: A critical review and future trends*. **International Journal of Refrigeration (2020)**, 116:129-45.

26. M. Amer, M. Nour, M. Ahmed, I. El-Sharkawy, S. Ookawara, S. Nada, and **A. Elwardany**, 2020. *Kinetics and physical analyses for pyrolyzed Egyptian agricultural and woody biomasses: effect of microwave drying*. **Biomass Conversion and Biorefinery (2020)**, 11 (6), 2855-2868.

27. M.K. Ashour, Y.A. Eldrainy, and **A.E. Elwardany**. *Effect of cracked naphtha/biodiesel/diesel blends on performance, combustion and emissions characteristics of compression ignition engine*. **Energy (2020)**, Feb 1;192:116590.

28. M. Hawi, H. Kosaka, S. Sato, T. Nagasawa, **A. Elwardany**, and M Ahmed, *Effect of injection pressure and ambient density on spray characteristics of diesel and biodiesel surrogate fuels*. **Fuel (2019)** *254*, p.115674.

29. M. Amer, M. Nour, M. Ahmed, S. Ookawara, S. Nada, and **A. Elwardany,** *The effect of microwave drying pretreatment on dry torrefaction of agricultural biomasses*. **Bioresource technology (2019)**, *286*, pp.121400-121400.

30. M. Hawi, **A. Elwardany**, S. Ookawara, and M. Ahmed, *Effect of compression ratio on performance, combustion and emissions characteristics of compression ignition engine*

fuelled with jojoba methyl ester. **Renewable Energy (2019)** 141,p. 632-645.

31. M. Hawi, **A. Elwardany**, M. Ismail and M Ahmed, *Experimental Investigation on Performance of a Compression Ignition Engine Fueled with Waste Cooking Oil Biodiesel–Diesel Blend Enhanced with Iron-Doped Cerium Oxide Nanoparticles*. **Energies, (2019)** 12(5), p.798.

32. I. Kabil, J. Sim, J. A. Badra, Y. Eldrainy, W. Abdelghaffar, M. Jaasim Mubarak Ali, A. Ahmed, S. M. Sarathy, H. G. Im, and **A. Elwardany**, *A surrogate fuel formulation to characterize heating and evaporation of light naphtha droplets*, **Combustion Science and Technology (2018)** 190, no. 7 1218-1231.

33. O. Rybdylova, L. Poulton, M. Al Qubeissi, **A.E. Elwardany**, C. Crua, T. Khan, and S.S. Sazhin, *A model for multi-component droplet heating and evaporation and its implementation into ANSYS Fluent*. **International Communications in Heat and Mass Transfer (2018)**, 90, pp.29-33.

34. M Al Qubeissi, SS Sazhin, **AE Elwardany**, *Modelling of blended Diesel and biodiesel fuel droplet heating and evaporation*, **Fuel (2017)** 187, 349-355.

35. D Kim, I El Gharamti, M Hantouche, **AE Elwardany**, A Farooq, F Bisetti *A hierarchical method for Bayesian inference of rate parameters from shock tube data: Application to the study of the reaction of hydroxyl with 2-methylfuran*, **Combustion and Flame (2017)** 184, 55-67.

36. **A. Elwardany,** S. Sazhin, H. Im, *A new formulation of physical surrogates of FACE A gasoline fuel based on heating and evaporation characteristics*, **Fuel (2016)** 176, 56–62.

37. **A. Elwardany,** J. Badra, J. Sim, M. Khurshid, M. Sarathy, and H Im, *Modeling of Heating and Evaporation of Multi-component FACE I Fuel Droplets*. **SAE Technical Paper (2016)** No. 2016-01-0878.

38. J. A. Badra J.A., Sim J., **A. Elwardany,** Jaasim M., Viollet Y., Chang J., Amer A.A., Im H.G., *Numerical Simulations of Hollow Cone Injection and Gasoline Compression Ignition Combustion With Naphtha Fuels,* **Journal of Energy Resources Technology (2016)**, Sep 1;138(5).

39. **A. Elwardany,** Et. Es-sebbar Et., E. Nasir E., A. Farooq, *A chemical kinetic study of the reaction of hydroxyl with furans*, **Fuel (2016),** 166 245-252.

40. **A. Elwardany**, J. Badra, A. Farooq, *High Temperature Rate measurements of OH + Xylenes: Shock Tube/Laser Diagnostics Study*, **Combustion and Flame (2015),** 162 6 2348-2353.

41. **A. Elwardany**, Et. Es-sebbar, E. Nasir, A. Farooq, *Unimolecular decomposition of formic and acetic acids using shock tube and laser diagnostics*, **Proceedings of the Combustion**

Institute (2014), 35 1 429-436.

42. J. Badra, **A. Elwardany**, A. Farooq, *Shock tube measurements of the rate constants for seven large alkanes + OH*, **Proceedings of the Combustion Institute (2014)**, 35 1 189-196.

43. S.S. Sazhin, M. Al Qubeissi, R. Nasiri R, V.M. Gun'ko, **A.E. Elwardany**, F. Lemoine, F. Grisch, M.R. Heikal M.R, *A multi-dimensional quasi-discrete model for the analysis of Diesel fuel droplet heating and evaporation*, **Fuel (2014),** (129) 238-266.

44. J. Badra, **A. Elwardany**, F. Khaled, V. Subith, A. Farooq , *A shock tube and laser absorption study of ignition delay times and OH reaction rates of ketones: 2-Butanone and 3-Buten-2-one*, **Combustion and Flame (2014)**, 161 (3) 725-734.

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46. S.S. Sazhin, M. Al Qubeissi, R. Kolodnytska, **A.E. Elwardany.**, R. Nasiri R., M.R. Heikal, *Modelling of Biodiesel Fuel Droplet Heating and Evaporation*, **Fuel (2014)**, 115, 559-572.

47. S.S. Sazhin, **A.E. Elwardany**, I.G. Gusev, J-F. Xie, Shishkova I.N., Cao B-Y., Snegirev A.Y., and Heikal M.R. (2013), New Models for Droplet Heating and Evaporation. **Asian Journal of Scientific Research (2013)**, 6: 177-186.

48. **A.E. Elwardany**, S.S. Sazhin, A. Farooq, Modelling of Heating and Evaporation of Gasoline Fuel Droplets: A Comparative Analysis of Approximations, **Fuel (2013)**, 111, 643-647.

49. S.S. Sazhin, J. Xie, I.N. Shishkova, **A.E. Elwardany,** M.R. Heikal, *A kinetic model of droplet heating and evaporation: Effects of inelastic collisions and a non-unity evaporation coefficient*, **Int. J. Heat Mass Transfer (2013)** 56, 525-537.

50. **A.E. Elwardany**, S.S. Sazhin, *A quasi-discrete model for heating and evaporation: application to Diesel and gasoline fuels*, **Fuel (2012),** 97, 685-694.

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52. **A.E. Elwardany,** I.G. Gusev, G. Castanet, F. Lemoine, Sazhin S.S. (2011), *Mono- and multi-component droplet cooling/heating and evaporation: comparative analysis of numerical models*, **Atomization and Sprays (2011)** 21 (11) 907-931.

53. S.S. Sazhin, **A.E. Elwardany**, E.M. Sazhina, M.R. Heikal (2011), *A quasi-discrete model for heating and evaporation of complex multi-component hydrocarbons fuel droplets*, **Int. J.**

Heat Mass Transfer (2011), 54, 4325-4332.

54. S.S. Sazhin, **A.E. Elwardany**, P.A. Krutitskii, V. Deprédurand, G. Castanet, F. Lemoine, E.M. Sazhina E.M., M.R. Heikal, *Multi-component droplet heating and evaporation: numerical simulation versus experimental data*, **Int. J. Thermal Sciences (2011)**, 50(2011) 1164-1180.

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56. S.S. Sazhin, **A.E. Elwardany**, P.A. Krutitskii**,** G. Castanet, F. Lemoine, E.M. Sazhina and M.R. Heikal, *A simplified model for bi-component droplet heating and evaporation*, **Int. J. Heat Mass Transfer (2010)** 53, 4495–4505.

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Conferences Proceedings

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60. M Marei Y Eldrainy, **A. Elwardany**, Mohamed El-Kassaby, An experimental study of the influence of Al2O3 nanoparticles fuel additives on the working characteristics of CI engine, Sep 2017 MCS-10: Tenth Mediterranean Combustion Symposium, Naples, Italy.

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