

Mahmoud Shaaban, Ph.D., P.Eng.

Assistant Professor of Mechanical Engineering at Nile University

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Mahmoud Shaaban is an Assistant Professor of Mechanical Engineering at Nile University. He holds a Ph.D. from Ontario Tech University, where his research specialized in Fluid-Structure Interaction (FSI), high-fidelity acoustic modeling, and experimental flow-sound synchronization. Dr. Shaaban possesses extensive experience in design, modeling, and diagnosis of acoustics and dynamic fluid systems.

Mahmoud's technical expertise includes advanced flow-sound interaction analysis and the development of aeroacoustic models. He is the PI of an STDF-funded project on thermoacoustic energy conversion. Mahmoud has experience in engineering analysis for power plant infrastructure, electronics noise and vibration, and fluid piping system design focusing on structural integrity and dynamics. His current research focuses on the mitigation and control of flow-induced acoustic and structural instabilities through the characterization of aeroacoustic source mechanisms and nonlinear system dynamics.

EDUCATION

PhD, Mechanical Engineering, University of Ontario Institute of Technology, 2019

Thesis title: Flow-excited acoustic resonance of inline arrangements of cylinders in cross-flow

Supervisor: Prof. Dr. A. Mohany

MSc, Mechanical Engineering, Cairo University, 2013

Thesis title: Experimental investigations on a standing-wave thermoacoustic engine

Supervisor: Prof. Dr. M. A. Fouad, Prof. Dr. Ehab Abdel-Rahman

BSc in Mechanical Engineering, Cairo University, 2010

EXPERIENCE

Assistant Professor, Mechanical Engineering

Nile University, Cairo, Egypt

2022-present

Cairo, Egypt

- Designs and delivers undergraduate courses in Thermal Sciences, Solid Mechanics, and Vibration;
- Chairs the Energy and Modelling Research Group at the Smart Engineering Systems Center;
- Directs a research team focused on vibration and aeroacoustics in renewable energy infrastructure;
- The Internal Auditor for the Mechanical Engineering Program to review documentation and implement corrective actions;
- Supports Efforts at the Mechanical Engineering Program to meet the requirements of the Accreditation Board for Engineering and Technology (ABET) and the 2022 Egyptian National Academic Reference Standards (NARS);
- partnerships with industry stakeholders to address engineering challenges;
- participation in the technical committee and acting as Session Co-Chair for the NILES international conference; and
- serves as a jury member for the Undergraduate Research Forum.

Senior Analyst, Process and Piping*Nile Dynamics Inc.*

2023-Present

Remote

- Licensed Professional Mechanical Engineer in Ontario remotely working for a consultant on projects of piping, with the following portfolio:
- Detailed ASME B31.3 Process Piping Stress Analysis calculations used to validate the design of complex piping systems.
- Create Concept Design for Process Plants
- Run analysis-based design for fluid systems using FEA on OpenFOAM and ANSYS.
- Verify thermohydraulic performance of fluid networks.
- Verify, and review technical engineering GA, isometrics, and P&ID drawings and reports on analysis, design, and diagnosis of various plant systems.
- Create detailed design plans for conceptual, preliminary and detailed engineering stages for multidisciplinary engineering projects.
- Implement a rigorous document workflow and a quality insurance plan according to employer and client requirements.
- Write proposals and estimates in response to OPG and BP RFPs.

Analysis Engineer, Thermalhydraulics and Piping*Next Structural Integrity*

2020-2022

Ontario, Canada

- Licensed Professional Mechanical Engineer in Ontario working for a consultant on project of a major power utility company, with the following duties:
- Perform detailed hydraulic calculations used to validate the design of complex piping systems.
- Verify designs against the rules of the ASME Boiler and Pressure Vessel Code (Section III and B31.1)
- Run analysis-based design for mechanical structures of powerplant systems using FEA.
- Verify thermohydraulic performance of fluid networks, including compressed gas, service water, and sanitary piping.
- Create, verify, and review technical engineering reports on analysis, design, and diagnosis of various powerplant mechanical systems.
- Create detailed design plans for conceptual, preliminary and detailed engineering stages for multidisciplinary engineering projects.
- Implement a rigorous document workflow and a quality insurance plan according to employer and client requirements.
- Conduct field walkdowns with key project stakeholders.
- Write proposals and estimates in response to OPG and BP RFPs.
- Worked with cross-functional teams to mitigate vibration and noise issues in aging piping systems.

Postdoctoral Research Fellow, Vibration and Fluid-Structure Interaction*Ontario Tech University*

2020-2021

Ontario, Canada

- Fluid-Structure Interaction (FSI) experiments in subsonic air wind tunnels.
- Static and dynamic Finite Element stress analysis of valves and pipelines.
- Prototype and testing platform development for noise control.
- Numerical simulations of flow-acoustic coupling and pulsating flow in pipelines.
- Prepared, reviewed and Co-authored technical reports and research articles.

Engineering intern, Noise and Vibration

2017

*Apple, Inc**Cupertino, CA*

- A member in the Noise and Vibration Engineering division working on project in the following tasks:
- Noise and Vibration measurements on electronic cooling fans.
- Data analysis for transient and steady state signals.
- Statistical Root cause analysis of noise sources.
- User study design for psycho-acoustic perception of noise.
- Ultra low-noise measurements in state-of-the-art facilities
- Worked with cross-functional teams to creative solutions to vibration and noise issues.

PhD Candidate

2014-2019

*Ontario Tech University**Ontario, Canada*

- Supported research activities related to Noise, Vibration, and Harshness (NVH) applications.
- Collected vibration and noise measurements on structural building components.
- Designed noise mitigation techniques for noise from cooling fans.
- Performed evaluation and control of sound transmission.
- Collected and analyzed Particle image velocimetry (PIV) flow measurements.
- Designed and built prototypes and testing platforms for noise control.
- Co-authored technical reports and research articles with the Aeroacoustics Research Team.

Postgraduate Student

2010-2013

*Cairo University**Cairo, Egypt*

- Supported research activities related to Mechanical Control and Thermoacoustics.
- Collected thermoacoustic measurements on innovative renewable energy systems.
- Designed techniques for power enhancements from Standing Wave Thermoacoustic Engines.
- Collected and analyzed Particle image velocimetry (PIV) flow measurements.
- Co-authored technical reports and research articles.

Research and Development Engineer

2011-2013

*American University in Cairo**Cairo, Egypt*

- Modeled and analyzed the performance of thermoacoustic devices.
- Implemented designs of thermoacoustic engines based on the state-of-the-art engineering standards.
- Developed numerical models of thermoacoustic engines.
- Prepared technical reports and oral presentations.

Research Intern

2009

*Freiberg University of Mining and Technology**Freiberg, Germany*

- Assisted research on heat transfer and thermal stresses in gas-filled porous foams.
- Simulated heat transfer through layers of porous materials.
- Analyzed experimental results to identify potential model parameters
- Prepared technical reports

PUBLICATIONS

To access the full articles, please visit <https://shaabanresearch.wordpress.com/publications/>

Under Review

- M. Rashed, A. Mohany, M. Raslan, M. Shaaban, **(under review)**, Quantitative spatial mapping of lift force and acoustic energy sources in the wake of a cylinder in cross-flow during lock-in, *submitted to the Journal of Sound and Vibration*.
- Z. Hamed, A. Abdellatif, M. Mourad, A. Eldien, M. Shaaban, **(under review)**, Reduced-order analysis of flow-excited acoustic resonance in a confined cylinder wake, *submitted to the Journal of Fluids and Structures*.

Journal Articles

- [1] A. Mohany, O. Hammad, H. Kishawy, M. Hassan, M. Shaaban **(2025)**, Acoustic resonance excitation and source mapping in co-axial piping systems with different junction edge geometries, *Journal of Sound and Vibration*, 119:163.
- [2] M. Rashed, A. Altohamy, M. Shaaban, I. Elsemary **(2025)**, Influence of bluff bodies on lean premixed combustion and pollutant emissions: A numerical approach., *Journal of International Society for Science and Engineering*, 7(2):, 29-38.
- [3] N. Salatein, M. Shaaban, and I. Fahim **(2025)**, Comparing low-cost activated carbon made from coffee waste and bagasse to remove heavy metals and methylene blue dye, *Results in Chemistry*, 13:102020.
- [4] N. Eldeeb, M. Shaaban, M. Afifi, I. Fahim **(2025)**, Informed decision-making in material selection for sustainable construction through life cycle assessment and environmental product declaration. *Discover Civil Engineering*, 2(1), 210.
- [5] M. Shaaban, R. Noufal, M. Alziadeh, and A. Mohany **(2024)**, Spinning dynamics of self-excited azimuthal acoustic modes in cavities, *Physics of Fluids*, 36: 075197.
- [6] M. Rashed and M. Shaaban **(2024)**, Influence of magnetically-induced nonlinear added stiffness on the lift galloping of square cylinders at low Reynolds number, *Journal of Fluids and Structures*, 124:104046.
- [7] S. Elhady, H. Inan, M. Shaaban, I. Fahim **(2023)**, Investigation of the Potential of Olive Leaf Extract as an Environmentally Friendly Inhibitor: SEM and Statistical (ANOVA) Studies, *Scientific Reports*, 13 (1), 17151.
- [8] M. Shaaban, and A. Mohany **(2022)**, Flow-acoustic coupling around rectangular rods of different aspect ratios and incidence angles, *Experiments in Fluids* 63:45.
- [9] M. Shaaban, and A. Mohany **(2021)**, Synchronous vortex shedding from aerodynamically isolated side-by-side cylinders imposed by flow-excited resonant acoustic modes, *Experiments in Fluids* 62:205.
- [10] M. Abdelmwigoud, M. Shaaban, and A. Mohany **(2021)**, Shear layer synchronization of aerodynamically isolated opposite cavities due to acoustic resonance excitation, *Physics of Fluids* 33:055112.

- [11] M. Shaaban and A. Mohany (2020), Experimental study of the self-excited resonance effect on the dynamic lift and flow structure around inline cylinders, *Journal of Fluids and Structures* 96:103015.
- [12] M. Abdelmwgoud, M. Shaaban, and A. Mohany (2020), Flow dynamics and azimuthal behavior of the self-excited acoustic modes in axisymmetric shallow cavities. *Physics of Fluids*, 32:115109.
- [13] M. R. Islam, M. Shaaban, and A. Mohany (2020), Vortex dynamics and acoustic sources in the wake of finned cylinders during resonance excitation, *Physics of Fluids* 32(7):075117.
- [14] M. Shaaban and A. Mohany (2019), Characteristics of acoustic resonance excitation by flow around inline cylinders, *Journal of Pressure Vessel Technology* 141(5):301.
- [15] M. Shaaban and A. Mohany (2019), Phase-resolved PIV measurements of flow over three unevenly spaced cylinders and its coupling with acoustic resonance, *Experiments in Fluids* 60:71.
- [16] M. Shaaban and A. Mohany (2018), Flow-induced vibration of three unevenly spaced in-line cylinders in cross-flow, *Journal of Fluids and Structures* 76:367-383.
- [17] A. Ibrahim, M. Emam, A. Fouad, and E. Abdel-Rahman (2016), A method to suppress harmonics in standing-wave thermoacoustic engines, *The Journal of the Acoustical Society of America* 139(4):2031.
- [18] M. Shaaban and A. Mohany (2015), Passive control of flow-excited acoustic resonance in rectangular cavities using upstream mounted blocks, *Experiments in Fluids* 56(4):56-72.

Theses

- [19] M. Shaaban. Flow-excited acoustic resonance of inline arrangements of cylinders in cross-flow. Ph.D thesis, University of Ontario Institute of Technology, 2019.
- [20] M. Emam. Experimental investigations on a standing-wave thermoacoustic engine. Master thesis, Faculty of Engineering, Cairo University, 2013.

Conference Articles

- [21] S. Mohamed, A. Fawky, M. Shaaban, A. Guaily and M. Elshabrawy, (2025) Optimum Design of Cold-Water Inlet in a Single-Tank Electric Water Heater," 2025 7th Novel Intelligent and Leading Emerging Sciences Conference (NILES), Giza, Egypt, 2025, pp. 1-4, doi: 10.1109/NILES68063.2025.11232055.
- [22] M. Emadeldin, M Rashed, A Mohany, and M Shaaban, Effect of coupled rotational and transverse vibration on the vortex structures around a rectangular cross-section. 2025 Journal of Physics: Conference Series, Volume 3058, 22nd International Conference on Applied Mechanics and Mechanical Engineering (AMME-22) 12/05/2025 - 15/05/2025 Cairo, Egypt, doi: 10.1088/1742-6596/3058/1/012002
- [23] M. Shaaban, M Rashed, and A. Mohany. Vortex-induced vibration of a rectangular cross section with transverse and rotational modes, In: Proceedings of the PVP 2025. Volume 3: Fluid Structure Interaction. Montreal, Canada. July 28 – Aug2, 2025. ASME.
- [24] M. Emadeldin, M. Rashed, A. Mohany, M. Shaaban, Effect of Nonlinear Magnetic Forces on Transverse Galloping Dynamics of Square Cylinders. 22nd International Conference on Applied Mechanics and Mechanical Engineering (AMME-22) 12-15 May 2025, Cairo, Egypt.

- [25] M. Aly, M. Shaaban, T. Kasem, R. Shalaby, Wind farm sensor fault diagnosis using artificial intelligence and wavelet transform, IET Conference Proceedings CP908, **2024**.
- [26] M. Rashed, M. Elsayed, M. Abdelrahman, and M. Shaaban, Effect of Nonlinear Magnetic Forces on Transverse Galloping Dynamics of Square Cylinders. Resourceedings, 4(2), 13–20, **2024**.
- [27] M. Shaaban, M Rashed, and A. Mohany. Influence of resonant acoustic mode shape on source and sink patterns in the wake of a single cylinder based on Howe’s Corollary. In: Proceedings of the PVP 2024. Volume 3: Fluid Structure Interaction. Bellevue, WA. July 28–Aug2, **2024**.
- [28] K. Chaudry, M. Shaaban, A. Alian, W. Mekky. FSI Impact Investigation of Steam Line Branch Hanger Failure. In: 27th International Conference on Structural Mechanics in Reactor Technology. Mar 15 **2024**, Yokohama, Japan.
- [29] S. Mohamed, A. Kamal, A. Guaily, and M. Shaaban Numerical Investigation of Hydrogen-Enriched Diesel Addition Effects in a Furnace Burner: Flame Temperatures and Exhaust Emissions, In: Proceedings of the 5th Novel Intelligent and Leading Emerging Sciences Conference. **2023**. Cairo, Egypt.
- [30] M. Elsayed, A. Mohamed, M. Shaaban, M. Abdelrahman, M. Ahmed and M. Rashed Developing a Floating Robot for Mechanical Control of Water Hyacinth, In: Proceedings of the 3rd International Mobile, Intelligent, and Ubiquitous Computing Conference (MIUCC-23). **2023**. Cairo, Egypt.
- [31] M. Emad, M. Rashed, H. Inan and M. Shaaban Numerical modeling of wave rotor pressure exchanger for supercritical CO2 Brayton cycles. Fifth International Turkic World Congress on Science and Engineering. **2023**. Cairo, Egypt.
- [32] M. Shaaban and A. Mohany. The Aeroacoustic Response of a Single Square Cylinder in Confined Cross Flow. In: ASME Pressure Vessels & Piping 2021 Conference, virtual, **2021**.
- [33] M. Shaaban and A. Mohany. Excitation of acoustic resonance by cross fluid flow over three inline cylinders. In: Proceedings of 9th International Symposium on Fluid-Structure Interactions, Flow-Sound Interactions, Flow-Induced Vibration & Noise, July 8-11, 2018, Toronto, Ontario, Canada, **2018**.
- [34] M. Shaaban, M. Abdelmwgoud, N. Arafa, K. Sachedina, A. Mohany, and M. Hassan. Measurements of acoustic admittance of piping systems at different flow velocities. In: 37th Annual Conference of the Canadian Nuclear Society, **2017**.
- [35] M. Abdelmwgoud, M. Shaaban, N. Arafa, K. Sachedina, A. Mohany, and M. Hassan. Use of Helmholtz resonators to suppress acoustic pressure pulsations in pipelines. In: 37th Annual Conference of the Canadian Nuclear Society, **2017**.
- [36] M. Shaaban and A. Mohany. Parametric investigation of the flow-excited acoustic resonance from multiple in-line cylinders in cross-flow. In: ASME 2015 Pressure Vessels and Piping Conference, USA, **2015**.
- [37] O. Sadek, M. Shaaban, and A. Mohany. Suppression of acoustic resonance in piping system using passive control devices. In: Proceedings of the Acoustics Week in Canada, volume 42, pages 58-59, **2014**.
- [38] A. Ibrahim, A. Elbeltagy, M. Shaaban, M. Abdelmwgoud, H. Omar, and E. Abdel-Rahman. Suppressing harmonics in standing-wave thermoacoustic engines. International Summer Workshop on Non-Normal and Nonlinear Effects In Aero-and Thermoacoustics, **2013**.

- [39] A. Ibrahim, A. ElBeltagy, M. Shaaban, and E. Abdel-Rahman. Development and analysis of non-linearity in the pressure waves resulting from thermoacoustic heat engines. In: Acoustics 2012 Conference , **2012**.
- [40] A. Ibrahim, M. Shaaban, H. Omar, K. Addas, and E. Abdel-Rahman. Performance evaluation of thermoacoustic engine using different gases . In: Nineteenth International Congress on Sound and Vibration (ICSV19), **2012**.

RESEARCH GRANTS & FUNDING

Principal Investigator (PI) | Science, Technology & Innovation Funding Authority (STDF)

Project: Development of an Experimentally-Validated Modeling Framework for Nonlinear Energy Dissipation in High-Amplitude Thermoacoustic Devices (Project ID: 53113)
EGP 1.4m, 2026-2028

Post-Doctoral Fellowship

Ontario Tech University
2021-2022

Ontario Trillium Scholarship

Ontario Ministry of Advanced Education and Skills Development
C\$ 160k, 2013-2017

Graduate Student Research Excellence Award

Faculty of Engineering and Applied Science
Ontario Tech, 2018

Graduate Student Conference Travel Award

Faculty of Engineering and Applied Science
Ontario Tech, 2017

Design and Implementation of a Renewable Energy Cycle Educational Stand

American Society of Heating, Refrigerating and Air-Conditioning Engineers
Cairo University, 2010

Award of Excellence for Engineering Students

The Schlumberger Foundation, Egypt, 2009

STUDENT SUPERVISION

Master of Science Theses

- [1] M. Ali (**2025**), Wind Farm Sensor Fault Diagnosis using Artificial Intelligence and Wavelet Transform. Master of Science in Mechatronics Engineering, Nile University.

Graduation Projects

- [1] Y. Shouman, A. Hany, A. Amr, A. Khaled (**2026**), Design and Development of a Smart Refrigeration System. Mech. Eng. Dept., Nile University.
- [2] A. Edress, A. Yousry, M. Mohamed, M. Abdelaal, N. Ibrahim (**2024**), Development of a double-beam magnetic-elastic wind energy harvesting device. Mech. Eng. Dept., Nile University.
- [3] A. Fawky, A. Zain, A. Mostafa, I. Almoaz, O. Mohsen, S. Alghalban, S. Mohamed, (**2023**), Optimum design of cold-water inlet in a single-tank electric water heater. Mech. Eng. Dept., Nile University.

- [4] M. Kohif, M. Omar, S. Abdelhafez, (2023), Optimum design of cold-water inlet in a single-tank electric water heater. Mech. Eng. Dept., Nile University.

ACADEMIC AND PROFESSIONAL COMMUNITY SERVICE

Internal Auditor

2023-current

Mechanical Engineering Program School of Engineering and Applied Science Council Nile University

- Active participation in the education quality of MENG Program at NU. Conducts systematic reviews of program documentation and quality procedures to ensure alignment with accreditation standards.

Committee Member

2022-current

School of Engineering and Applied Science Council

Nile University

- Active participation in the progress of the academic activities at Nile University through the School and program council. I was assigned a member role in the academic bylaw committee to develop the updated bylaws according to the Egyptian National Academic Reference Standards (NARS 2022) set by the Egyptian National Authority for Quality Assurance and Accreditation of Education (NAQAAE).

Graduate Students Representative

2018

Academic Council, FEAS Faculty Council, and Teaching & Learning Advisory Committee OntarioTech University

- Elected representative on the Academic Council, FEAS Faculty Council, and Teaching & Learning Advisory Committee, influencing university-wide academic planning and teaching innovation funds.

Session Chair, Energy

2022-2026

NILES 2022 Conference

Nile University

- Managed technical sessions for the IEEE-sponsored conference, facilitating peer-review and scholarly exchange.

Elected Executive Officer

2017-2020

Public Service Alliance of Canada Local 555

- Represented the interests of Research Assistants, Post-Doctoral Fellows, and Sessional Lecturers within university administration.

Technical Reviewer

- Fluids, Multidisciplinary Digital Publishing Institute (MDPI), ISSN 2311-5521.
- Shock and Vibration, Hindawi Publishing Corporation, ISSN 1875-9203.
- Pressure Vessels & Piping Conference, The American Society of Mechanical Engineers, 2016-2021

Member, American Society of Mechanical Engineers

2013-

- Active contributor to the ASME community through regular publication and peer-review service for the annual Pressure Vessels & Piping (PVP) Conference.

Jury member

2022-

Research Forum, Nile University

- Evaluated innovative student projects to promote a culture of research and creative problem-solving.

PROFESSIONAL AFFILIATIONS

Professional Engineer

Professional Engineers Ontario, license no. 100526097

Mechanical Engineer

Egyptian Engineering Syndicate, license no. 2-600534-2010-2