

## **CURRICULUM VITAE**

Name : Mohamed Yehia Mohamed SHALABY  
Nationality : Egyptian  
Date of birth : 06/01/1962  
Marital status : married  
Address : Al Imam Mohammad Ibn Saud Islamic University, Riyadh  
Electrical Eng. Dept.  
Faculty of Engineering , KSA  
Mobile : +966582004788  
E-mail: [mshalaby88@gmail.com](mailto:mshalaby88@gmail.com)  
[mshalaby88@yahoo.com](mailto:mshalaby88@yahoo.com)  
[myshalaby@imamu.edu.sa](mailto:myshalaby@imamu.edu.sa)



Google Scholar site :  
<https://scholar.google.com/citations?user=vuQSzBYAAAAJ&hl=en>

ResearchGate site :  
<https://www.researchgate.net/profile/Mohamed-Shalaby-7>

### **ACADEMIC RECORD**

#### **1) B. Sc. in electronics and communications. ( 1979-1984)**

University : Ain Shams            Location : Egypt  
Grade : Excellent with honors  
Graduation project : Microprocessor controlled alarm security system, under the supervision of Professor N. El -Nady (from the Military Technical College).

#### **2) Postgraduate Diploma (1984-1989)**

##### **a) Master of Science**

University : Ain Shams            Location : Egypt  
Degree awarded : M. Sc. in Optical Communications.  
Thesis title : Chromatic dispersion control in single mode optical fibers.  
Grade : Excellent  
Thesis supervisors :    1) Professor M. Hanafi AHMED  
                                  2) Professor M. IBRAHIM

##### **b) Diplôme d'Etudes Approfondies (DEA)**

University : Institut National Polytechnique de Grenoble.  
Location : France  
Degree awarded : DEA in opto-electronics  
Thesis title : Microlenses fabrication on glass by ionic exchange.  
Grade : Very good  
Thesis supervisors :    1) Professor G. CHARTIER  
                                  2) Dr. D. PERSEGOLE

### **3) Ph.D. Degree (1990-1993)**

University : Limoges                      Location : France

Degree awarded : Doctor of the University of Limoges

Discipline : Electronics and Optics

Specialization : Nonlinear Optics

Thesis title : Interaction experiments between auto-guided beams "Solitons"; New picosecond photonic applications.

Grade : Très honorable avec félicitations du jury.

Thesis supervisors :    1) Professor C. FROEHLY  
                                  2) Dr. A. BARTHELEMY (Ph.D., D. Sc.)  
                                  IRCOM ( U.A. C.N.R.S. N° 356)

## **PROFESSIONAL EXPERIENCES**

### **1984    Microprocessor controlled alarm security system**

We studied in this project the performances and limitations of several sensors and transducers ( infrared, microwave, ultrasonic, piezoelectric, . . . ). This study also comprises the security planning and the distribution of the sensors over the place to be protected. We have designed and realized an electronic interface circuit to connect these sensors to a microcomputer. We have also written an assembly language program to monitor the different sensors and to take the necessary actions for each situation.

### **1985 Teaching in the Military Technical College**

I supervised projects dealing with microprocessor controlled systems like:

- \* Computer controlled security system
- \* Speech Synthesizer and Recognition

In these projects we designed the electronics necessary and the software behind for operation.

### **1986-1989 -Teaching Assistantship**

I was engaged as a researcher and lecturer assistant in the Department of Electronics and Communications Engineering at the University of Ain Shams in Egypt. I taught the following courses:

- 1- Microwave Engineering ( waveguides, passive cavity resonators, antennas, . . . ).
- 2- Microwave Electronics ( klystrons, magnetrons, parametric amplifiers, . . . ).
- 3- Telephony.
- 4- Electronics laboratory.

### **From 1993 – Jan. 1997**

I worked as an Assistant Professor in the faculty of Engineering – Ain Shams University in Cairo - Egypt in the Department of Electronics and Communications. I taught the following courses:

- \* Pulse and Digital Electronics
- \* Digital Communication
- \* Optical Communications
- \* Optical Communications (M. Sc. course ).

I supervised the following graduation projects:

- \* Performance study and measurements on a Mercedes Benz Motor model with electronic injection and ignition.
- \* Optical Time Domain Reflectometer OTDR for testing fiber links.
- \* Optical fiber video link.

### **Jan. - July 1996**

I worked as an Assistant Professor for Post graduate students in the National Institute of Laser and Enhanced Sciences NILES in Cairo University for teaching the following :

- Lasers and fiber optics in medicine.
- Optical fibers experiments laboratory.

### **Jan. 1997-until August 2008**

I worked as An assistant professor in the Telecom and Information College in Riyadh, Kingdom of Saudi Arabia.

### **August 2008 – July 2011**

Assistant professor in Ain Shams University, Faculty of Engineering-Electronics and communications department

### **July 2011 - Now**

Associate professor in Ain Shams University, Faculty of Engineering-Electronics and communications department

### **November 2013 – Now**

Associate professor in Al Imam Mohammad Ibn Saud Islamic University, Faculty of Engineering-Electronics and communications department

## **RESEARCH WORKS**

### **1986 - 1989 - Chromatic dispersion control in single mode optical fibers.**

I carried out this work under the supervision of Professor A. HANAFI and Professor M. IBRAHIM in the Department of Electronics and Communications Engineering at the University of Ain Shams in Egypt.

I studied three different techniques to reduce the effect of chromatic dispersion and hence to increase the bandwidth of single mode fibers at the wavelength of 1.55  $\mu\text{m}$  which corresponds to the minimum loss window of telecommunications.

The first solution was to determine the index profile which moves the zero dispersion wavelength found previously at 1.3  $\mu\text{m}$  for step index fibers to 1.55  $\mu\text{m}$ . I made a critical survey of the different index profiles proposed in the literatures.

The second studied technique was to predistort the pulses by a phase relation before transmission so as to compensate the effect of dispersion. I studied in this part analytically and numerically the compression of chirped pulses produced by directly modulating diode lasers with the aid of group velocity dispersion of fibers.

The third solution used the soliton regime to counterbalance the effect of the group velocity dispersion by the self phase modulation resulting from the nonlinear index gradient. In this study, I showed by a perturbative technique the effect of fiber guiding on the parameters of solitons calculated by solving the nonlinear Shrodinger equation in a bulk medium.

### **1990 - Microlenses fabrication on glass by ionic exchange.**

This research work was carried out at the Institut National Polytechnique de Grenoble under the supervision of Professor G. CHARTIER between April and July 1990.

We have realized microlenses on glass by ionic exchange as a preliminary step towards the integration of more complex optical functions on glass. We have used silver as the dopant ions and BK7 as the glass substrate. For this purpose, we have elaborated a numerical model to determine the optimum values of the parameters of the ionic exchange. The model is divided into two parts:

- The distribution of the dopant ion concentration and hence the index gradient was calculated by solving the diffusion equation using the finite difference method,
- After finding this index profile, a version of the Beam Propagation Method in cylindrical coordinates was implemented to study the performance of this index profile as a lens and a second program of ray tracing was used to characterize the aberration of the lens.

The performance of the microlenses was evaluated experimentally and was found to be in good agreement with the numerical predictions

### **1990-1993 - Interaction experiments between auto-guided beams "Solitons"; New picosecond photonic applications.**

I have prepared a Ph.D. thesis in nonlinear optics in the Department of Optics at IRCOM (Institut de Recherches en Communications Optiques et Microondes) under the supervision of Professor C. FROEHLY and Dr A. BARTHELEMY. In a series of

experiments, we have studied the propagation of spatial solitons and its applications to ultrafast switching and optical logic operations.

These picosecond photonic applications used the particular characteristics of a pair of spatial solitons in phase quadrature or the interaction of solitons with intersecting trajectories. I have extended later this work for a low power optical signal by superposing it on one of the interacting soliton pair. In this case, the nonlinear interaction between the two solitons modifies their trajectory and creates new index gradients which allow to change the path of the guided light and even to divide it into beams of equal power.

We have carried out an experiment showing that soliton propagation in a quasi-bi-dimensional geometry and the induced guiding allow to increase in a substantial manner the diffraction efficiency by laser induced dynamic gratings in nonlinear media.

Using cross phase modulation, we have succeeded in guiding a beam with a black soliton profile in a self focusing medium, superposed to a beam of different frequency with a bright soliton profile.

We have also studied the nonlinear propagation in three dimensions with a Laguerre-Gaussian beam profile and we have concluded that this profile is stable and is capable of carrying several times the critical power of self focusing but it does not represent an invariant solution by nonlinear propagation.

### **September - October 1994**

I worked with the group of Integrated Optics in the Laboratoire d'Electromagnétisme, Microondes et Optique LEMO in Grenoble-France. The aim of this work is to realize an integrated optical filter on a confined waveguide fabricated by the ionic exchange with Potassium on glass. The techniques used to fabricate the filter are the Lift-Off method and the chemical etching.

### **October 2008 until November 2013**

Beside teaching as an assistant professor (Associate Professor from July 2011) in the electronics and communications department in Ain Shams University, I participated in two research projects for the Egyptian Army.

# The first project is to design and implement a fiber optic gyroscope. This work includes:

- Assembly and test of fiber Sagnac interferometer
- Design, implementation, and test of open loop FOG circuits
- Simulation of closed loop FOG algorithm
- Design, implementation, and test of closed loop FOG circuits
- Assembly, and test of inertial measurement IMU unit

# The second project is to design and implement a fiber optic transceiver.

### **November 2013 until now**

Besides teaching (as an Associate Professor) at Imam Mohammad Ibn Saud Islamic University in Riyadh, KSA, I have authored and co-authored research projects as follows:

- 1- Author of research project funded by Deanship of Academic Research – Imam Mohammad Ibn Saud Islamic University, 2014-2016. The topic of the research is “Optical Coherence Tomography”.
- 2- Co-author of a research project funded by Deanship of Academic Research – Imam Mohammad Ibn Saud Islamic University, 2015-2017. The topic of the research is “Gas detection using FT-IR spectrometers”
- 3- Co-author of a research project funded by King Abdulaziz City for Science and Technology (KACST), 2016-2018. The topic of the research is “ECT tomography for real time imaging of fluid flow in oil pipes”.
- 4- Author of research project funded by Deanship of Academic Research – Imam Mohammad Ibn Saud Islamic University, 2020-2022. The topic of the research is “Improved pattern recognition technique for better accuracy of air pollutants detection”.
- 5- Co-author of a research project funded by Deanship of Academic Research – Imam Mohammad Ibn Saud Islamic University, 2022-2023. The topic of the research is “Artificial Intelligence for Optimization of Solar Systems in Saudi Arabia”.
- 6- Co-author of a research project funded by Deanship of Academic Research – Imam Mohammad Ibn Saud Islamic University, 2023-2024. The topic of the research is “Effect of electric vehicles charging on the grid”.
- 7- Co-author of a research project funded by Deanship of Academic Research – Imam Mohammad Ibn Saud Islamic University, 2023-2024. The topic of the research is “An inverse algorithm to reduce autocorrelation noise in optical coherence tomography”
- 8- Co-author of a research project funded by Deanship of Academic Research – Imam Mohammad Ibn Saud Islamic University, 2023-2024. The topic of the research is “Enhancing Converters Performance for PV systems by utilizing Machine Learning Algorithms”
- 9- Co-author of a research project funded by Deanship of Academic Research – Imam Mohammad Ibn Saud Islamic University, 2023-2024. The topic of the research is “Simulation and Design of an Optical Coherence Tomography Based on Optoelectronic Oscillator”

## **PUBLICATIONS**

1- **M. SHALABY** and A. BARTHELEMY, "Observation of the self-guided propagation of a dark and bright spatial soliton pair in a focusing nonlinear medium", IEEE J. of Quantum Electron. pp. 2736-2741, vol. QE- 28, Dec. 1992.

2- **M. SHALABY** and A. BARTHELEMY, "Ultrafast photonic switching and splitting through cross phase modulation with a spatial soliton couple", Opt. Comm. pp.341-345, vol.94, 1992.

3- **M. SHALABY**, F. REYNAUD, and A. BARTHELEMY, "Experimental observation of spatial solitons interactions with  $\pi/2$  relative phase difference", Opt. Lett. vol.17, pp.778-780, 1992.

- 4- R. de la FUENTE, **M. SHALABY**, and A. BARTHELEMY, "Improvement of the efficiency of laser induced dynamic gratings in a Kerr medium by a spatial soliton", Pure and Appl. Opt., vol.1, pp.1-6, 1992.
- 5- **M. SHALABY**, and A. BARTHELEMY, "Experimental spatial soliton trapping and switching", Opt. Lett., vol.16, pp.1472-1474, 1991.
- 6- A. Barthelemy, **M. SHALABY**, "Nonlinear power limits of the compression by optical fibers of chirped pulses emitted by diode lasers", Electronics Letters, vol. 29, no.6, pp.533-535, March 1993.
- 7- A. BARTHELEMY, B. COLOMBEAU, C. FROEHLY, F. REYNAUD, **M. SHALABY**, and M. VAMPOUILLE, "Solitons and other stable solutions to instability problems of nonlinear and laser optical processing", invited paper - International Symposium on signals, systems and Electronics, Paris September 1992.
- 8- C. FROEHLY, **M. SHALABY**, and A. BARTHELEMY ; "Soliton-like self trapping of three dimensional patterns" invited paper, Eighth International Conference on Ultra-fast Phenomena, Antibes, France, June 1992.
- 9- A Barthélémy, F Reynaud, **M Shalaby**, O Guy, C Froehly, "Soliton beams in liquid carbon disulfide", Quantum Electronics and Laser Science Conference, Optical Society of America, 10 May 1992.
- 10- Alain Barthélémy, Claude Froehly, Raül de la Fuente, Olivier Guy, François Reynaud, and **Mohamed Shalaby**, "Spatial solitons", Indo-French Workshop on Optoelectronics, 1992, Goa, India.
- 11- Alain Barthélémy, Raül de la Fuente, Claude Froehly, **Mohamed Shalaby**, François Reynaud, "Spatial Solitons in carbone disulfide". Quantum Electronics and Laser Science Conference, 1992, Anaheim, United States.
- 12- Alain Barthélémy, Claude Froehly, Raül de la Fuente, François Reynaud, and **Mohamed Shalaby**, "Optical processing of light signals by means of soliton refractive index gradients", Tenth Topical Meeting on Gradient-Index Optical Systems, GRIN 92, 1992, Santiago de Compostella, Spain.
- 13- Alain Barthélémy, Raül de la Fuente, Claude Froehly, Olivier Guy, **Mohamed Shalaby**, and F. Reynaud , "Soliton self-trapping of light beam", OSA-IEEE joint meeting on "Nonlinear Guided Wave Phenomena", vol.15, pp.380, September 1991, Cambridge, United Kingdom.
- 14- A. Barthelemy, C. Froehly, and **M. SHALABY**, "Nonlinear propagation of picosecond tubular beams: Self phase modulation and induced refraction" PROCEEDINGS-SPIE THE INTERNATIONAL SOCIETY FOR OPTICAL ENGINEERING 2041, Mode-locked and Other Ultrashort Laser Designs, Amplifiers, and Applications, page 104, Optics Québec '93, 16-20 August 1993, Québec, Canada.
- 15- **Mohamed Shalaby**, and Alain Barthelemy, "Expériences d'interactions entre faisceaux autoguidés «Solitons»; nouvelles opérations de photonique picoseconde -

Experiments of interaction between auto-guided beams «solitons»; new photonic picosecond operations”, Ph. D. Thesis Thesis number 93 LIMO 0204, Scientific domain Optique, Université de Limoges, Limoges, France, 1993.

16- **M. SHALABY**, ”Transformation of the three-dimensional Beam Propagation Method to two dimensions for cylindrically symmetric structures based on the Hankel transform”, *Pure and Applied Optics*, vol. 5, pp. 997-1004, 1996.

17- M. H. Ahmed, **M. SHALABY**, and F. M. Misk; ”Opto-Optical switching on diffraction gratings built in erbium doped fibers” *Scientific Bulletin of the Faculty of Engineering, Ain Shams University, Part II* ,vol. 33, no. 4, pp. 113-121, December 1998.

18- F. M. Misk, **M. SHALABY** and M. H. Ahmed ;”Combined erbium and Raman amplification at 1.55  $\mu\text{m}$  in submarine links using backward pumping at 1.48  $\mu\text{m}$ ” *Pure and Applied Optics*, vol. 7, pp. 659-666, 1998.

19- F. M. Misk, **M. SHALABY** and M. H. Ahmed ;” Optimum design rules of erbium doped fiber preamplifier at 1.55  $\mu\text{m}$  pumped at 1.48  $\mu\text{m}$  “Second International Conference on Lasers & Applications, Cairo 16-19 September 1996, pp. 111-112

20- T. A. Amer, **M. SHALABY**, and D. A. M. Khalil ;“comparative study of Beam Propagation techniques for 3-Dimensional cylindrically symmetric structures” *Second International Conference on Lasers & Applications, Cairo 16-19 September 1996*, pp. 56-57.

21- **M. SHALABY** ;” Nonlinear tubular Bragg diffraction and all-optical switching over Laguerre-Gaussian beams” *Pure and Applied Optics*, vol. 1, pp. 346-353, 1999.

22- F. M. Misk, **M. SHALABY** and M. H. Ahmed ;"Nonlinear Switching of Femtosecond Light Pulses Over Fiber Bragg Gratings: A Finite Difference Time Domain Approach", *Mediterranean Sea Symposium, Ain Shams University, Cairo, Egypt, May 2003*.

23- H. E. Kotb, **M. SHALABY**, and M.H. Ahmed, “Generation of Nanosecond Optical Pulses with Controlled Repetition Rate using In-cavity intensity modulated Brillouin Erbium Fiber Laser” *Progress In Electromagnetics Research, PIERS*, vol. 113, pp. 313-331, 2011.

24- A. Fathallah, **M. SHALABY**, “Generalized Bessel beams in modified axially symmetric graded index structures” *Applied Optics*, vol. 50, no. 19, pp. 3128-3134, July 2011.

25- Ahmed Hisham Morshed, and **Mohamed Yehia Shalaby**, “Bending Characteristics of Single mode-Multimode-Single mode Optical Fiber Structures”,*31st National Radio Science Conference (NRSC)*, April 2014, 303-310.

26- Haitham Omran, Sami Sakhawi, **Mohamed Shalaby**, and Daaa Khalil, “ Linewidth of swept laser source” *SPIE Photonics west, Optical Coherence Tomography and*



Coherence Domain Optical Methods in Biomedicine XVI, January 2012, San Francisco, California, USA, vol. 8213.

27- Mohamed A. Mahmoud, **Mohamed Y. Shalaby**, and Diaan Khalil, "Propagation of Bessel beams generated using finite-width Durnin Ring" APPLIED OPTICS / Vol. 52, No. 2 / 10 January 2013

28-Haitham Omran, Diaan Khalil, and **M. Shalaby**, "MEMS based Swept Laser Source for OCT Applications", SIECPC 2013, Riyadh SA, 27-30 April 2013.

29- AlaaEldin S. M. El Hady, Yasser M. Sabry, **Mohamed Yehia Shalaby**, and Diaan Khalil, "Dual-fiber OCT measurements", SPIE BiOS, Photonics West 2014, USA, Part of SPIE MOEMS-MEMS Paper 8977-286 February 2014.

30- Haitham Omran, Yasser M. Sabry, Mohamed Sadek, Khaled Hassan, **Mohamed Y. Shalaby**, Diaan Khalil, "MEMS optical tunable filter based on free-standing sub-wavelength silicon layers", SPIE BiOS, Photonics West 2014, USA, Part of SPIE MOEMS-MEMS Paper 8977-28, 6 February 2014.

31- H Omran, YM Sabry, M Sadek, K Hassan, **M. Y. Shalaby**, D Khalil , "Deeply-etched optical MEMS tunable filter for swept laser source applications", IEEE PHOTONICS TECHNOLOGY LETTERS vol. 26, No. 1, January 2014, pp. 37-39.

32- O. Eltantawy, I. Sayed, H. Elgamal, **M. Shalaby**, and A. Elhennawy, " High Q, low phase noise RF generation of optoelectronic oscillators using different topologies", International Journal of Enhanced Research in Science Technology & Engineering, ISSN: 2319-7463, Vol. 3 Issue 1, January-2014, pp: (266-272).

33- Tarek A. Al-Saeed, **Mohamed Y. Shalaby**, and Diaan A. Khalil, "Dispersion compensation in Fourier domain optical coherence tomography", 10 October 2014, Vol. 53, No. 29, APPLIED OPTICS, pp. 6643.

34- Tarek A. Al-Saeed, **Mohamed Y. Shalaby**, and Diaan A. Khalil, "Study of dual-source Fourier-domain optical coherence tomography", Optical Engineering, vol. 54(10), October 2015.

35- **M. Shalaby**, Kamal Khalil , Abdelrahman E. Afifi , and Diaan Khalil, " Ring Mirror Optical Rotation Sensor" Patent, March, 2015.

36- **M. Shalaby**, and Sulaiman S. Al Sowayan, "Autocorrelation noise free Optical Coherence Tomography using the novel concept of Resonant OCT (ROCT)", Journal of the European Optical Society-Rapid Publications, vol. 12, issue 1, article 10, 25 July 2016.

37- **M. Shalaby**, Kamal Khalil , Abdelrahman E. Afifi , and Diaan Khalil, "Ring Mirror Fiber laser Gyroscope", Oral presentation in SPIE PW2017, Lase 2 February 2017.

38- Ahmed Shebl, **Mohamed Y. Shalaby**, Khaled Sharaf, and Diaan Khalil, "A method for determining the direction of rotation in ring laser gyroscope based on fiber ring cavity and semiconductor optical amplifier", Fiber Lasers XIV: Technology and

Systems, part of SPIE LASE The Moscone Center San Francisco, California, United States, 28 January - 2 February 2017.

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40- **Mohamed Shalaby**, Ibrahim Sayed, Khalid Sharaf,” Direction-aware optoelectronic fiber gyroscope”, *Optoelectronics and Advanced Materials – Rapid Communications*, Vol. 13, No. 7-8, July-August 2019.

41- Fawzi Alorifi, Sidi M Ahmed Ghaly, **Mohamed Y Shalaby**, et.al, “ Analysis and detection of a target gas system based on TDLAS & LabVIEW”, *Engineering, Technology & Applied Science Research*, Volume 9, Issue 3, Pages 4196-4199, 2019.

42- SMA Ghaly, KA Al-Snaie, MO Khan, **Mohamed Shalaby**, MT Oraiqat, “Design and Simulation of an 8-Lead Electrical Capacitance Tomographic System for Flow Imaging”, *Engineering, Technology & Applied Science Research* 11, 2021, (4), 7430-7435.

43- Shalaby Abdul Rahman M., Almuhan Khalid A., **Shalaby Mohamed**, “Environmental pollution monitoring: a novel vectorial algorithm technique for oil detection in wastewater”, *Spectroscopy Letters* 2020, , 53:10, 737-744, DOI: 10.1080/00387010.2020.1832529

44- **Mohamed Shalaby**, and Fawzi Alorifi, “Environmental pollution detection: A novel chirped spectral modulation algorithm for a more accurate monitoring of gas pollutants in the atmosphere”, *J. Eur. Opt. Society-Rapid Publ*, Volume 19, No. 9, 14 February 2023, <https://doi.org/10.1051/jeos/2023005>.

45- Sidi M A Ghaly, **Mohamed Shalaby**, Mohammad Obaidullah Khan, Khaled A AlSanei, Asad Ali Mohamed, Faisal Baloshi, Abdalmajid Imad, Majdi Oraiqat, "Diagnosis of Fluid Dynamics in a Closed Pipe using 8-Electrodes ECT System", *Engineering, Technology & Applied Science Research*, 2023.

46- Sidi M A Ghaly, **Mohamed Shalaby**, Mohammad Obaidullah Khan, Khaled A AlSanei, Asad Ali Mohamed, Faisal Baloshi, Abdalmajid Imad, Majdi Oraiqat, "12-Electrode ECT Sensor with Radial Screen for Diagnosis of Fluids", *Engineering, Technology & Applied Science Research*, 2023.

47- Sidi M. Ahmed Ghaly, Mohammad O. Khan, **M Shalaby**, Khaled A Al-snaie, and Majdi Oraiqat, “Image and Velocity profile reconstruction using a Customized 8-16 Electrode Electrical Capacitance Tomography Sensor Based on LabVIEW Simulation”, *Journal of Nanoelectronics and Optoelectronics*, 2023.

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