



**Professor Raphael T. Haftka (1944 – 2020)**

See:

<http://www2.mae.ufl.edu/haftka/>

<http://www.worldcat.org/identities/lccn-n79-41185>

<http://www.barnesandnoble.com/c/raphael-t-haftka>

<http://www.amazon.com/Raphael-T.-Haftka/e/B001HCWO4U>

[http://www.informatik.uni-trier.de/~ley/db/indices/a-tree/h/Haftka:Raphael\\_T=.html](http://www.informatik.uni-trier.de/~ley/db/indices/a-tree/h/Haftka:Raphael_T=.html)

[http://www.researchgate.net/researcher/39304851\\_Raphael\\_T\\_Haftka](http://www.researchgate.net/researcher/39304851_Raphael_T_Haftka)

Distinguished Professor  
Department of Mechanical and Aerospace Engineering  
University of Florida, Gainesville

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<https://doi.org/10.1007/s00158-020-02737-7>:

**Professor Raphael (Rafi) T. Haftka (1944-2020)**

The Structural and Multidisciplinary Optimization (SMO) community mourns the loss of Professor Raphael Haftka who led our Journal as Editor in Chief since 2015 until he left us on August 16, 2020. Beyond his tremendous impact on our Journal and as a researcher during his remarkable 50-year career, he will be remembered by many as a dear friend, a mentor, and role model who stood out with wisdom, kindness, humility, generosity, and selfless service. He is also known for his universal silver lining perspective of an eternal optimist, with a distinct twist of Haftka style sense of humor.

Professor Haftka was born February 22, 1944, in Tel-Aviv, Israel. His professional journey started as an aerodynamicist at the Israeli Aircraft Industries from 1965 to 1968. From 1973 to 1975 he was a senior lecturer at Technion-Israel Institute of Technology, after postdoctoral research fellowships at NASA and other US organizations. His career moved to the USA when he became an Assistant Professor at Illinois Institute of Technology in 1975. Subsequently, he held the positions as Professor/Christopher Kraft Professor at Virginia Tech from 1981 to 1994, and Professor/Distinguished Professor at the University of Florida from 1995 until retirement in 2019.

During his tenure as editor in chief, Professor Haftka significantly advanced the legacy of our founding editor Professor George Rozvany, doubling the journal's publishing volume and further strengthening its scientific impact. In particular, he made it a top priority for the journal to focus on its readers, emphasizing in his own words: "(a) Publish papers that are of interest; (b) Publish papers that are not unnecessarily difficult to read; (c) Publish papers with results that are easy to replicate". Two years ago, he introduced a new policy, making "Replication of Results" a mandatory section for all SMO publications. He also further strengthened our unique voluntary editor system invented by the founding editor George Rozvany. Now handling editors are credited by name in the publications. Another equally important aspect Rafi emphasized was about fairness and equal opportunity for every contributing author. He constantly reminded our team of around 40 review editors the importance of avoiding bias and the appearance of bias. All these efforts have been highly appreciated by authors, editors, and readers.

Professor Haftka's contributions to our research field are immeasurable—some important statistics: 330 journal papers, 530 conference proceedings papers, 12 book chapters and two textbooks, and over 34,000 Google citations. His major research impacts include—early pioneering contributions to the approximation concept including the far-reaching convex/conservative approximation; landmark papers on sensitivity analysis; leadership in creating/promoting MDO, surrogate modeling, and nondeterministic methods. Beyond his remarkable contributions as a researcher, Professor Haftka was also a key influencer within his research community. He was among the founders of ISSMO (International Society of Structural and Multidisciplinary Optimization) in 1991 and served as ISSMO's second president between 1995 and 1999. He has received many distinctions throughout his career, including Virginia Tech Alumni Award for Excellence in Research, AIAA Fellow, AIAA Multidisciplinary Design Optimization Award.

Another unique trademark of Professor Haftka's career is his broad outreach in collaborative research: he supervised 65 PhD students, cooperated with colleagues worldwide, and was especially fond of nurturing aspiring young researchers. He coauthored papers with over 180 peers, excluding his

students.

Professor Haftka is survived by his beloved wife and companion, Rose Haftka. We wish to extend our deepest condolences to Rose and their extended family.

Obituary written by: Silvia Schilgerius, Senior Publishing Editor at Springer and Helder Rodrigues and Ming Zhou

**PERSONAL:**

Born February 22, 1944, Tel-Aviv, Israel; U.S. Citizen; married.

**EDUCATION:**

Ph.D. 1971, Department of Aerospace and Mechanical Engineering Sciences, University of California at San Diego

B.Sc. 1965, M.Sc. 1968, Aeronautical Engineering, Technion-Israel Institute of Technology.

**AREAS OF INTEREST:**

Optimization methodology applied in structural design including sensitivity calculation and approximation techniques.

The application of design-of-experiment techniques to engineering design optimization.

Multidisciplinary optimization of aerospace vehicles.

Genetic algorithms with special interest to the design of composite panels.

Miniature unmanned aerial vehicles.

**PROFESSIONAL RECORD:**

Distinguished Professor, Department of Mechanical & Aerospace Engineering, University of Florida, 1999-present, Professor 1995-1999.

Christopher Kraft Professor of Aerospace and Ocean Engineering, Virginia Polytechnic Institute and State University, 1988--1994, Professor, 1981--1988.

Associate Professor at Illinois Institute of Technology - Department of Mechanical Engineering, 1978-1981, Assistant Professor 1975-1978.

Senior Lecturer at Technion-Israel Institute of Technology 1973-1975

National Academy of Sciences, Post Doctoral Research Associate at NASA Langley Research Center, 1971-1973.

Staff Scientist at Structures Research Associates (Laguna Beach, California) October 1970-1971.

Aerodynamicist at the Israeli Aircraft Industries, 1965-1968

**PROFESSIONAL SOCIETIES:**

President, International Society for Structural and Multidisciplinary Optimization (ISSMO)(1995-99); Fellow, AIAA; Member ASEE

**HONORS:**

Christopher Kraft Professorship, 1988.

Virginia Tech Alumni Award for Excellence in Research, 1992.

AIAA Fellow, 1997

AIAA Multidisciplinary Design Optimization Award, 1998.

Distinguished Professor, 1999

University of Florida Research Professorship, 2001-2003

**TEACHING**

My major interest in teaching is introducing optimization techniques into the undergraduate curriculum and bringing them to bear on undergraduate design activities. For this purpose I have introduced into the curriculum 3 undergraduate optimization courses - a general optimization course, a course on experimental optimal engineering design and a composite structures and material optimization courses. Additionally, I have initiated and collaborated with colleagues on the introduction of mini-design projects into structures and vibration-and-control courses.

### **Curriculum Development at the University of Florida**

EGM 6365 Structural Optimization: Developed and introduced this course at Virginia Tech and then at the university of Florida. Course seeks to introduce students to modern methods for structural design mostly in the fields of aerospace and civil engineering. Taught first in 1996 as special topics course, and in Fall 1998 as a regular course. See also course web page at <http://www.mae.ufl.edu/haftka/stropt> .

EGM 4473 Experimental Optimum Engineering Design: Developed and introduced this course in 1996 as a special topics course and then as a regular course in 1997. The course seeks to demonstrate to students how both analytical and experimental techniques are used in the design process. The course is centered around a project. This innovative course has drawn praise from graduate students in industry who took it as a special topic course. One of the students in the 1997 course, Terry Siorek, a specialist in hematology instrumentation, collaborated on a paper describing the project in this year Multidisciplinary Analysis and Optimization conference. The 1996 project, developed with Dr. Jenkins of AeMES, was de-scribed in a paper published in Structural Optimization in February 1998. A set of notes was developed for the course and made available to students on the course web page (<http://www.mae.ufl.edu/haftka/eoed/>).

EAS 4240 Aerospace Structural Composites: Introduced an optimization segment into the course as a guest instructor in a two-week segment in order to broaden the design experience of the students. This will be further expanded in Spring 1999, when I will teach the course out of a newly developed textbook (see below).

EAS 4200C and EAS 4210C Aerospace Structures 1,2: Introduced mini-design projects for these two courses, using the remarkable capabilities for optimization now available in commonly available spreadsheet programs (Microsoft Excel, Lotus 1-2-3, Quatro Pro).

See course web pages (<http://www.mae.ufl.edu/haftka/course.html> )

### **RESEARCH**

My research area is structural and multidisciplinary optimization. In the area of structural optimization, my students and I investigate diverse applications ranging from the development of algorithms to the experimental validation of reliability based optimization. The focus of many of these investigations is the design of structures made from composite materials. The combinatorial nature of the stacking sequence design for composite laminates is particularly challenging, and has motivated my work in the development of genetic algorithms for this application.

In the past few years I have focused much of my interest in optimization methodology into methods that are used for experimental optimization. These methods, commonly known as design-of-experiment techniques, are becoming increasing appropriate because of the growing similarities between computer simulations through complex numerical models and physical experiments.

In the area of multidisciplinary optimization I have focused on combined structure and control optimization of space structures, and on combined aerodynamic and structural optimization of aircraft wings. The first topic has a strong experimental flavor, because I believe that much of the challenge in the area of structural control derives from the discrepancy between theoretical results and what can be achieved in real applications. In the area of combined aerodynamic and structural optimization, I am currently working with three other faculty members and five graduate students in a major effort of developing design methodology for the next generation super-sonic transport. I am also working with a team of colleagues and students at Virginia Tech on the design of a truss braced transport, with the truss brace allowing for a substantial improvements in aspect ration and lift to drag ratios.

Another multidisciplinary program involves the design of miniature unmanned aerial vehicles. The focus in this research is on the smallest size that can be achieved with present day technology. I am working with seven other faculty members in AeMES and one in Electrical and Computer Engineering on various aspects of aerodynamics, control and performance of miniature aircraft.

I like to work with colleagues, and I attempt to share all of my graduate students with other faculty members or NASA researchers. This arrangement benefits the students, and it helps me create interactions with and learn from my colleagues. This interaction results also in joint papers and joint research proposals. Over my 13 years at Virginia Tech, I have written papers with 8 faculty colleagues in my department and 8 in other departments. At the University of Florida I have published papers with 4 faculty members. Since 1991 I have also published papers with 10 NASA researchers and colleagues from other many other countries including, Belgium, Denmark, France, Germany, Israel, Italy, Japan, Poland and Turkey.

### PROFESSIONAL ACTIVITIES

I believe that many researchers and industrial practitioners do not have the time to read the large numbers of papers that are published in their field. I have invested much effort in keeping abreast of the latest development in the areas of structural and multidisciplinary optimization and I attempt to use this to provide a service to the engineering community in these fields. I have written a textbook (with Gürdal) which has an extensive list of references, and which we update regularly. I have written several survey papers, and I review about 30--40 papers per year, mostly for the AIAA journals. I have also served as associate editor of the AIAA Journal 1980--1982. In reviewing papers I always attempt to call the authors attention to related work that they might have overlooked. I also organized and chaired many sessions in scientific meetings (mostly AIAA).

Recently I have focused on improving the cooperation between industry and universities in the area of multidisciplinary optimization. In May of 1993 I have organized (together with my colleagues Grossman and Mason) an industry-university workshop on multidisciplinary aircraft design attended by most of the major aircraft manufacturers. The recommendations of the workshop for changes in the way universities, industry and government interact were published in July 1994 in Aerospace America. I have also intensified my own work with industry, and recently I have been working on projects with Boeing, McDonnell Douglas and the Ford Scientific Research Laboratory.

I am the president of the International Society of Structural and Multidisciplinary Optimization (1995--1999). This young society (founded by George Rozvany in 1991) has about 400 members, and is concerned with promoting international research and education in Structural and Multidisciplinary optimization. I am also a member of the AIAA Technical Committee on Multidisciplinary Design Optimization. I continue as a member of the executive committee of ISSMO.

### PUBLICATIONS:

An extensive list is provided on the website: <http://www2.mae.ufl.edu/haftka/resume/resume.htm>