

James C. Wyant, My Academic Boss

Virendra N. Mahajan*

James C. Wyant College of Optical Sciences, University of Arizona, Tucson AZ 85721

ABSTRACT

Professor James C. Wyant and I came to know each other when he joined the Optical Sciences Center (OSC) at the University of Arizona in 1974, where I had just completed my PhD degree and was working as a Research Associate. However, shortly thereafter I left Tucson for Draper Lab in Cambridge, MA, and later, for The Aerospace Corporation in the Los Angeles area. I had been teaching a course at the University of Southern California on optical imaging and aberrations when Jim asked me to teach at OSC. While I agreed to teach voluntarily, he also said that I should ask my employer to pay for the expenses to commute from Los Angeles to Tucson, and I did. That is how Jim became my academic boss, and I began teaching at OSC in 2004. Over time, Jim honored me for my voluntary teaching by naming the OSC Applied Optics Lab in my name. I discuss here how my acquaintance with Jim grew to an enduring friendship as an adjunct professor under Jim's leadership.

Key words: Wyant Tribute, Optics Education, Optical Imaging and Aberrations, Ray Geometrical Optics, Wave Diffraction Optics, Wavefront Analysis

1. MY EARLY ACQUAINTANCE WITH JIM

Jim joined the Optical Sciences Center in August 1974 when I was getting ready to defend my PhD dissertation under Professor Jack Gaskill. Upon my successful defense, Jack promoted me to Research Associate with some increase over my research assistant salary. Soon thereafter my wife asked me to get a real job to overcome living in poverty. Whereas Jim had moved from the Boston area, I got there in December and started working at Draper Lab in Cambridge (formerly Instrumentation Lab at MIT in the aeronautical engineering department) on DARPA's Space Optical System programs. So, Jim and I did not get to know each other much. I got tired of the cold in Boston and, after working there for almost 9 years, I moved to the Los Angeles area to work at The Aerospace Corporation on the Air Force satellite programs.

2. TEACHING AT OSC

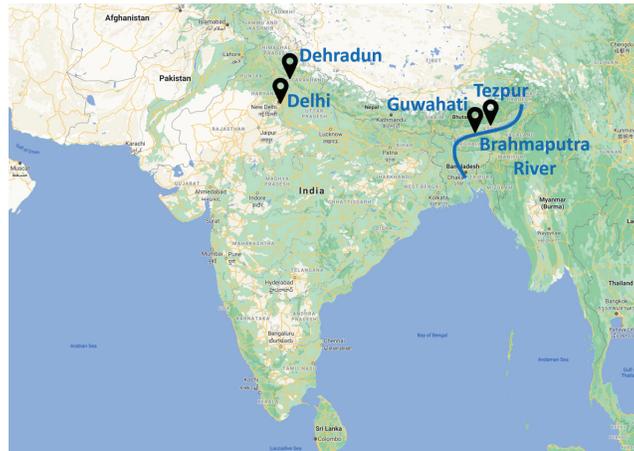
I was always interested in teaching and thought that I had a knack for simplifying and explaining complex topics. The Electrophysics department at the University of Southern California (USC) wanted to grow in the optics area. So, I made a contact, and started teaching an evening class there on Advanced Geometrical Optics that I developed into both ray geometrical and wave diffraction optics. As faculty members who were promoting optics growth left USC, the interest in optics started waning. By 2001, I had written my first three books [1–3], and Jim was familiar with them. He was the director of OSC, and he asked me to teach an advanced course on optical aberrations.

I was glad to accept Jim's offer of adjunct professorship and teaching at the school I had graduated from. It was clear that I would be teaching voluntarily. But I did not know that I would have to find funds for my commute from Los Angeles to Tucson. He suggested that I ask Aerospace, my employer, to pay for my travel. I went to one of my senior vice presidents at Aerospace who had spent time at OSC as a student and requested travel support. To my pleasant surprise, I got the support. Thus, began my journey with Jim as my Academic Boss in 2004, and I started teaching OPTI 596c, Aberrated Imaging and Propagation.

*virmahajan12@gmail.com

3. OPTICAL SOCIETY OF INDIA (OSI) INVITATION AND FIRST INDIA TRIP WITH JIM

I received an invitation from OSI to participate in their annual meeting in 2005. I asked Jim if he would like to participate and present an invited paper at the meeting. Jim accepted my suggestion and he, Professor José Sasián, and I went to Dehradun, in northern India, where the meeting was held. OSI management was elated to see Jim at the conference.



Map of India showing the locations of OSI meetings. (a) Dehradun in 2005 and (b) Tezpur in 2007

Jim expressed interest in riding an elephant, and the Rajaji park for such a ride was not too far from where we were staying. It turned out be a challenge though when we went there. The elephant had been booked for the duration of our stay in Tezpur, but my disappointment was short lived. Some local person came to me and said, “Walk to the elephant owner’s home and talk to him about it. You can ride the elephant from his home to the usual starting point of the elephant ride.” That was a perfect solution, as we were not looking for the usual one-hour long ride.” Jim and José enjoyed the 20-minute ride which was sufficiently long.



Elephant joyride showing Professors José Sasián and Jim Wyant

When Jim developed a mild fever, we rescheduled our papers a day earlier than planned, and boarded a train for a five-hour journey to Delhi. OSI management, especially, Professor Kehar Singh of the Indian Institute of Technology Delhi, was most helpful with making all the arrangements. Jim's condition got better by the hour, and he felt practically normal by the time we reached Delhi, and I breathed a sigh of relief. Next evening, we all had a restful dinner at my sister's home.

4. TEACHING SHACK'S COURSE ON INTRODUCTION TO ABERRATIONS

When Professor Roland Shack started feeling ill and could not teach his class OPTI 518 on Introduction to Aberrations, Jim tried but could not find a substitute instructor for the class. So, he asked me to teach. He offered me \$ for this teaching assignment, but I taught voluntarily. I gave 15 lectures, gave homework with each, mid-term and final exams. Fortunately, I got the same teaching assistant who had helped me with my regular course and, therefore he knew about the optical aberrations. When the semester was over, I handed over my lecture charts and homework problem solutions to Professor José Sasián, and I went back to teaching my regular class on Aberrated Imaging and Propagation.

5. OSC APPLIED OPTICS LAB NAMING

I was pleasantly surprised and honored when Jim told me that for my voluntary teaching by then and in the future, OSC will name a room in my name. I did not know what to do about it. When Professor Jim Burge heard about it, he called and told me there was a perfect room for this purpose. I should visit the Applied Optics Lab and consider naming it after me. Well, I was happy with the choice and that is what I did. I related this lab with optical testing and that, in turn, I related with my work on wavefront analysis.



Jim honored Virendra for his voluntary teaching by naming the Applied Optics Lab in his name

6. OSI INVITATION AGAIN AND SECOND TRIP TO INDA

We received an invitation for participating in the 2007 meeting of OSI held in Tezpur, Asaam in northeast India. Jim and I decided to go again. We were told to fly to Guwahati, Assam, and from there we will be taken to Tezpur, driving along the Brahmaputra river that originates in the Himalaya in China, runs throgh India, and ends in the Bay of Bengal through Bangladesh.

When we arrived in Guwahati, the driving route had been changed, and we could not even stay in a hotel for security reasons. As Americans, we were thought to be at risk in that region. We stayed at a Government of India facility, and we were chauffeured to the meeting site at Tezpur University back and forth on inside roads. Jim was declared the chief guest of the conference. He performed the Saraswati Vandana (prayer to the goddess of learning, knowledge, arts including music, and literature) by lighting the oil-wick lamps, and inaugurated the confrence. This was followed by singing a patriotic song in praise of the historical city of Tezpur by students of the electronics and communication engineering and physics departments. Jim was OSA V-P Elect that year and he got the opportunity to lay the groundwotk on a Memorandum of Understanding between OSA and OSI.



Students of the electrical communication engineering and physics departments singing in praise of the historical city of Tezpur per the Tezpur University tradition

The OSI management decided to honor Jim along with the OSI luminaries with an ad-hock award. The photo shows the past four presedients with their years of service as presidents.



Jim with former OSI presidents displaying awards given by OSI in Tezpur. From left to right: Prof. Ajoy K. Ghatak, IIT Delhi (2001–04); Prof. Kehar Singh, IIT Delhi (1991–94); V. N. Mahajan of The Aerospace Corporation; Mr. J. A. R. Krishna Moorthy, Director of Instruments Research & Development Establishment (IRDE, Dehradun) (2006–08); Prof. Jim Wyant, Prof. Rajpal S. Sirohi (1994–96), IIT Madras).

7. JIM, THE HELPER

Jim has many characteristics that define him as a great person. As noted in the Tribute Program, they include extraordinary, leader, educator, metrologist, inspirer, enabler, and futurist. I would like to add *helper*. Many years ago, I had taken a short course from Jim on optical testing. Today, the only thing I remember about it is him saying "...and then I pull a piece of hair from my head, though I feel that I have been pulling too many." Well, he used to have plenty of hair, as shown in the photo below, but he sacrificed it all for his students. Zernike circle polynomials were in widespread use for wavefront analysis, and I had developed corresponding polynomials for other pupil shapes (such as annular, hexagonal, rectangular, and elliptical, etc.). So, I said to Jim that "you invent and build precision instruments to measure aberrations, teaching short courses on optical testing, why not have a compendium course at the SPIE meetings in San Diego on Wavefront Data Analysis." He used his charm, and I started teaching such a short course in 2016.



Jim checking his birthday gift from his maternal grandfather, circa 1950

Jim helped me in many other ways as well. For example, he nominated me for the SPIE Conrady award, which I received in 2006. I was a member of the OSA fellows committee, and he made me its chair in 2009 when he was OSA president-elect. He reviewed my books and wrote a wonderful Foreword for my fourth book on Wavefront Analysis [4] that was published by SPIE Press in 2013.

8. SCHOLAR AND A GENTLEMAN

Jim is a perfect example of a scholar and a gentleman. He awarded 34 PhD and 25 MS degrees and published 160 research papers in a 39-year career at OSC. He is one of only four who have been presidents of both SPIE and OSA. He is a member of the National Academy of Engineering and the National Academy of Inventors, and the recipient of OSA's Fraunhofer award, SPIE's Gold Medal and Visionary awards, and NASA Goddard's Achievement in Excellence award for his contributions to the James Webb Telescope, to mention a few. As an entrepreneur, he has advanced the science and technology of optical metrology and has worked incessantly to educate the global optics and photonics community in this field. History will judge Jim to be the Thomas Alva Edison of optical metrology. This year, Jim was bestowed the rank of distinguished fellow by OSI. He is brilliant, yet modest and simple, and so generous. In his India visits, he never made a negative comment. I am honored to have an enduring friendship with Jim.

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