

OBITUARY
PROF. SUBHASH BHATT, 1949-2020

M. H. VASAVADA

1. FAMILY BACKGROUND AND SCHOOL EDUCATION

Prof. Subbhaschandra Jayantilal Bhatt was a native of Gadat, a village in South Gujarat in western part of India. He was born on 26 March 1949. His father Jayantilal and his mother Shardaben had a little education. Shri Jayantilal was a priest in the village. Dr Bhatt had three sisters and a family with very modest financial means, naturally, lived a simple life.

Dr. Bhatt had his school education in Gadat. He was an outstanding student and earned respect of his friends and teachers. By the time he was in 8th standard he had realised that he was more inclined towards mathematics than towards any other subject and the seeds of the idea of pursuing a career in mathematics were sown. He had made up his mind in this direction when he finished school education. He performed extremely well at the school board examination and would have had no difficulty in getting into medicine or engineering study - an obvious choice for almost all students. Dr. Bhatt opted to go for pure science and joined Garda College, Navsari for his Bachelor's degree. He obtained his B.Sc. degree in 1970 and M.Sc. degree in 1972, both with first class and both from South Gujarat University, Surat. Then came a crucial period in his life. With a fist class in M.Sc., Dr. Bhatt could have easily got a lecturer's position in a college in those days. With the kind of financial condition of his family this was a natural course for him to take. But Dr. Bhatt took a bold decision which would have looked irrational and rash to others. He wanted to pursue the path of research in pure mathematics and he thought that his M.Sc. training in subjects like topology and analysis was inadequate to start on this path. So he decided to stay home and study these subjects in depth and in detail.

2. PH.D. STUDY

After spending more than one year at home after finishing his M.Sc. study, Dr. Bhatt came to Vallabh Vidyanagar to join as a research student in the Department of Mathematics of Sardar Patel University in August 1973. He was a CSIR Fellow. He took longer to complete his Ph.D. work than a student of his calibre would normally take. This was partly due to the health problems he faced during his Ph.D. years. He suffered form severe backache.

Also, he did not want to make any haste for his degree. He wanted to spend time in extensive reading and research, which he did, laying strong foundation on which he would build his research career, resulting in more than 100 research publications. My work was limited to commutative Banach algebras. Dr. Bhatt worked in a more general setting of topological algebras, especially topological $*$ -algebras. His thesis was on Generalized B^* -algebras. He got his Ph.D. degree in 1979.

3. TEACHING AND ADMINISTRATION

In 1980, Dr. Bhatt was appointed as a lecturer in the Department of Mathematics of Sardar Patel University, the same department where he worked for his Ph.D. degree. He was appointed as a reader in 1986 and as a Professor in 1997. He worked as the Head of the Department from 2001 to 2011 and retired in 2011. During the tenure of his teaching career, Dr. Bhatt taught many courses in both pure and applied mathematics. After developing a good grounding in pure mathematics, Dr. Bhatt turned to understand how mathematics helps in understanding the nature. For this he studied extensively Classical, Statistical and Quantum Mechanics and Theory of Relativity and designed and taught courses in these areas for post-graduate students.

4. CONTRIBUTION TO THE DEPARTMENT

Dr. Bhatt contributed a lot to put the research programme of the department on sound footing. Besides his own research work, he encouraged college teachers, and M.Sc./M.Phil. students who had potential for research to join the research programme of the Department. It was at his initiative that the department started bringing out technical reports containing research work done in the Department on a regular basis. Because of his wide-ranging research work, Dr. Bhatt was known to many mathematicians and educators of the country and abroad. This helped the Department to get the benefit of eminent mathematicians to participate in seminars hosted by the Department. It also helped the Department to get grants for NHBM regional library, UGC programmes, and infrastructural facilities. Dr. Bhatt also helped the University in preparing its annual reports and proposals and reports to be presented to UGC and NAAC.

5. AWARDS AND PRIZES

- A Narasingh Rao Gold Medal (1990): Indian Mathematical Society for the best research papers published in the periodicals of the Society during the year.
- Hari Ohm Ashram Prerit Shree Bhaikaka Inter University Smarak Trust Prize for the best research paper in Mathematics for the years: 1989, 1990, 1991, 1992, 1993, 1995-96, 2005-07 and 2007-09.

- Ramanujan Prize given by the university of Madras for the best single authored paper in last -five years; 2004.
- Prof. Hansraj Gupta Memorial Award given by Indian Mathematical Society: 2010.
- Prof. A. R. Rao Research Award given by Prof. A. R. Rao Foundation, Gujarat Ganit Mandal, 2013.

Fellowships:

- 1997: Fellow of Gujarat Science Academy
- 2009: Fellow of Academy of Sciences, Bangalore.

Positions of Eminence:

- NHBM Visiting Professorship: Sardar Patel University: 2011-2013.
- Scientist, DST PURSE Program, S. P. University: September 2013 to March 2014.
- UGC Emeritus Fellowship: 2015-2017.

Visits Abroad:

- Visiting Fellow: Dept. of Applied Mathematics, Fukuoka University, Fukuoka, Japan. September 1996 and May-June 2006.

6. RESEARCH WORK

Prof. Bhatt's research career spanned over more than four and a half decades. During this long active research career, he published more than 100 research papers of which more than one third are singly authored, while the rest are in collaboration with his research students and other research workers. We give here a very brief outline of his research work.

6.1. Banach, Topological and Operator Algebras:

- (1) Prof. Bhatt's thesis deals with Generalized B^* -algebras. A Generalized B^* -algebra is a topological $*$ -algebra satisfying certain conditions. He has shown that a topological $*$ -algebra is a Generalized B^* -algebra (GB^* -algebra) if and only if it contains a sequentially dense B^* -algebra. He has given a detailed analysis of three typical GB^* -algebras viz., $L^\omega(X)$, $\mathfrak{M}(X)$ and $D(T)$. Here X is a finite measure space with positive measure and T is the unit circle. $L^\omega(X)$ is the Arens algebra on X , $\mathfrak{M}(X)$ is the algebra of measurable functions on X and $D(T)$ is the algebra of distributions on T .
- (2) Investigation of different aspects of various Banach algebras and topological algebras:-
The algebras studies are:
 - (i) Uniform algebras on the polydisc and the unit ball in the several complex variables.
 - (ii) Topological algebras of Köthe spaces.
 - (iii) Banach algebras of Sobolev spaces.
 - (iv) Frechet algebra of power series.
 - (v) Banach and Frechet algebras with a Laurent series generator.

- (vi) Projective limit of C^* -algebras.
- (vii) Algebras of unbounded operators.
- (viii) Segal algebras.
- (ix) Limit algebra of differential forms.
- (x) Uniform algebras with unique uniform norm property.
- (3) Investigation of automatic continuity problem:
 - (i) Automatic continuity of seminorms with square property on a Banach algebra.
 - (ii) Automatic continuity of homomorphisms on certain classes of topological algebras.
- (4) Study of differential and Lipschitz structure of certain algebras of bounded operators.
- (5) Study of structural analogy between C^* -algebra and uniform algebra.
- (6) Gelfand-Mazur type theorem.

6.2. Operator Theory:

- (1) Study of unbounded subnormal operators on a Hilbert space and their minimal extensions.
- (2) Study of n -tuples of bounded linear operators on a Hilbert space and their joint spectrum.

6.3. Harmonic Analysis:

Harmonic analysis on abelian groups and semigroups with weights has been studied. ω is a continuous weight function on a locally compact abelian group G . The unique uniform norm property (UUNP) for the Beurling algebra $L^1(G, \omega)$ as well as for Banach subalgebras of the weighted measure algebra $\mathcal{M}(G, \omega)$ is investigated. Also the weighted multipliers on a weighted discrete abelian semigroup (S, ω) are studied.

6.4. Interdisciplinary studies:

- (1) Hilbert space formalism of quantum mechanics to describe the phenomenology of enzyme-substrate recognition.
- (2) Use of fractal dimension to distinguish left hand thumb prints of different individuals and to distinguish between healthy and unhealthy hearts.
- (3) Use of fractal Brownian model for financial market.

7. HUMAN AND SCHOLASTIC QUALITIES

Dr. Subhash Bhatt was a man of principles, simplicity, integrity, and honesty. He was a good teacher and a good administrator. In spite of being engrossed in research, he always found time to help his fellow beings. He loved his family, his country and was proud of Indian culture and heritage. Despite his humble upbringing and education in a rural school, he was well read and well versed in languages. He had a good command over English and was interested in Sanskrit.

He was spiritually inclined and studied Indian scriptures.

Dr. Bhatt passed away on 26th February, 2020, just one month short of 71 years. He met with a scooter accident, underwent surgery and appeared to be recovering well. Suddenly he developed heart problem which proved to be fatal. He is survived by his wife, Dr. Sujata, who is a retired professor of Zoology and a daughter, Shreema, who is pursuing her Ph.D. study in Mathematics.

RETIRED PROFESSOR AND HEAD, DEPARTMENT OF MATHEMATICS, SARDAR PATEL UNIVERSITY, VALLABH VIDYANAGAR, 388120 (INDIA)