

Dr. S. Ahmad Ali

M. Sc., Ph. D., F.I.M.A. (U.K.)

Professor & Head, Department of Mathematics

Dean, School of Applied Sciences

Babu Banarasi Das University

Faizabad Road, Lucknow 226 028, Uttar Pradesh, India

Tel. +91 522 391 1065 (off.), 2323905 (res.), 9415583389 (Cell)

Email: ali.sahmad@yahoo.com, ali.bbdu@gmail.com

Education

M. Sc.: Mathematics (Statistics), Avadh University, 1987

Ph. D.: Mathematics, Kanpur University, 1995

Thesis Topic: *A Study of Distribution Theory and an Application of Fractional Integration to Certain Integral Transformations and Integral Equations*

Areas of Interest: Special Functions, Fractional Calculus, Number Theory, q-series, Continued Fractions and Mock Theta Functions.

Research Contribution

In my earlier research work, I have studied the Distributional aspect of the various integral transforms and the fractional integral operators. This such a study of these distributional integral transforms and fractional integral operators helps us in solving the dual integral equations which are of frequent occurrence in mathematical physics. To further generalized these aspects and make them more useful, currently I am involved in making a study of generalized hypergeometric functions theory which is expected to yield more useful results.

I have introduced the two new forms of the extended Hankel transforms given by A. L. Schwartz and G. Ahuja by the use of 'cut' Bessel function of H. Kober. I also have introduced their variants. I have studied the mapping properties of these operators on Zemanian and Koh spaces of test functions and corresponding spaces of generalized functions. I have obtained the relations of one of my operators with some of the elementary differential operators.

The Erdelyi-kober operators of fractional integration were extended by L.G.Makarenko. I have extended the definition of Riemann-Liouville and Weyl operators of fractional integration for two-dimensional cases. I have studied the behavior of Makarenko's and aforesaid operators for generalized functions. For this purpose I also have constructed a testing function space and its dual. I have asserted that these operators can be used to solve

the pair of dual integral equations.

I have used the definition of two distributions to prove an improved form of the Leibnitz theorem for the fractional derivative of the product of two distributions of arbitrary order. I further have generalized the above result and have given another form of the theorem by differentiating fractionally the product with respect to a continuously differentiable function.

I have introduced certain modified forms of Ramanujan's mock theta functions. By the use of q-fractional integral operators of R.P. Agarwal and W. Al Salam, I have been able to produce some very interesting integral relations between the mock theta functions of different order, particularly between the fifth order functions belonging to the two different groups. I have defined the partial series of the mock theta functions, recently found in Ramanujan's 'Lost Notebook'. I have given some alternative forms to these functions and have established certain relations between them which definitely throw light on their structure and also they may have number theoretic interpretations. I have produced some hypergeometric representations of the mock theta functions found in the 'Lost' Notebook through some known hypergeometric series transformations. These representations suggest a new approach of study of these functions. Very recently, I have introduced four generalized q-functions which yield the mock theta functions of order six and ten as their special cases. Interestingly, the said q-functions have certain differential properties and satisfy the certain difference equations. Further, I have given certain alternative expansions to these functions and have also related them with their partial forms through q-series. The generalized partial function relations are expected to yield interesting results in the theory of restricted partitions as in the case of partial theta functions.

In a recent work I have produced certain continued fraction representations for the ratios of basic hypergeometric series and for certain hypergeometric series of special type. These representations cover a number of known continued fraction as its special cases including some of those given by Ramanujan.

Research Papers:

1. Riemann - Liouville & Weyl Fractional Integral Operators for generalized Functions; Ranchi Univ. Math. Jour., Vol. 21 (1990).
2. The Extended Schwartz's Hankel Transformation for Generalized Functions; *Jour. M.A.C.T.*, Vol. 25(1992).

3. The n - Dimensional Extended Hankel Transformation for Generalized Functions (with G. Ahuja); Ganita, Vol. 45, No.1(1994).
4. Leibnitz Theorem for Fractional Derivative of Generalized Functions. Ranchi Univ. Math. Jour., Vol. 25 (1994).
5. On the Generalized Operators of Fractional Integration. Ganita Sandesh, Vol.14, No.2 (2000)
6. An Application of Generalized Operators of Fractional Integration. Math. Stud., Vol.69. No.1-4 (2001).
7. A Unified Mock Theta Function. South East Asian Jour. Math., Vol.1(2), 2002
8. Fifth order Mock Theta Functions and their relations. Alig. Bull. Math. Vol. 22, No. 1, 2003.
9. Properties of Certain Fractional q -Integral Operators and 'Cut' q -Hankel Transform. Proc. Nat. Acad. Sci.(India), 74 (A), I, 2004.
10. Transformations of Mock Theta Functions found in the 'Lost' Notebook. (with R.Y. Denis & S.N. Singh). Jour. Ind. Acad. Math., Vol. 26 (1), 2004.
11. A basic Hypergeometric approach to Mock Theta Functions found in the 'Lost' Notebook. Proc. Nat. Acad. Sci.(India), 74 (A), I, 2004.
12. An infinite family of mock theta function. Proc. 4th Annual Conference of SSFA, University of Rajasthan, Jaipur (India), 2005.
13. A Bilateral Extension of Second Order Mock Theta Functions. South East Asian J. Math, 6(2), (2008)
14. Certain Mock Theta Functions found in the 'Lost' Notebook. Math. Sci. Res. Jour., 12 (2) 2008.
15. Leibnitz Theorem for Fractional Derivative of Generalized Functions -II. Bull. Pure Appl. Math., 3 (1), 2009.
16. Some new identities of eight order Mock theta Functions. Italian J. Pure Appl. Math. 27 (2), (2011)
17. On Continued Fraction Representation of Certain Function of Hypergeometric Type, Jour. Ramanujan Math. Soc. & Math Sci., 1 (2), 2012 (With S M H Rizvi)
18. Certain Basic Hypergeometric Series Identities Through q -Exponential Operator Technique, Int. Bull. of Math. Res., Int. Bull. Math. Res., 1(1), 2014 (with Aditya Agnihotri)
19. Certain Transformations and Summations of Basic Hypergeometric Series, J. Math. Comput. Sci. 5 (1), 2015 (with S N H Rizvi)

20. A Continued Fraction for Second Order Mock Theta Functions, International Journal of Mathematical Analysis, Vol. 9 (24), 2015
21. On Applications of Ramanujan Sum, Communicated, (with Aditya Agnihotri)
22. Certain Transformations of Basic & Polybasic Hypergeometric Series, (with S N H Rizvi)
23. Certain New WP Bailey Pairs and Basic Hypergeometric Series Identities, (with S N H Rizvi)
24. On Certain Transformations of Basic Bilateral Hypergeometric Series, (with S N H Rizvi)
25. On Generalization of Ramanujan's Partial Theta Function Identities,
26. On Certain Basic Hypergeometric Series and Continued Fraction,
27. On Certain q-Functions associated with Mock Theta Functions
28. A Note on Bilateral Basic Hypergeometric Series $2 \rightarrow 2$ Transformation (with S N H Rizvi)
29. Transformation and Summations of Basic Hypergeometric Series (with S N H Rizvi)
30. A New Summation of ~~Series~~ and Applications (with Aditya Agnihotri)
31. The Boundedness of Generalized Lowndes Operators. (with P. K. Banerji)
32. An Application of Fractional Integral Operators to the pair of Dual Integral Equations for Generalized Functions (with P. K. Banerji)
33. Transformation & Summations for Bilateral Basic Hypergeometric Series

PAPERS/ INVITED TALKS IN CONFERENCES

Papers

1. Extended Swartz's Hankel Transformations for generalized functions. Annual conference of Bharat Ganita Parishad, Lucknow University, Dec. 1992.
2. Leibnitz Theorem for Fractional Derivative of Generalized Functions. 64th Conference of Indian Mathematical Society, Gurukul Kangri University, Dec. 1998
3. Properties of Certain Fractional q-Integral Operators and 'Cut' q-Hankel Transform. National Conference of the Society for Special Functions and their Applications held at J N Vyas University, Jodhpur, March 2 - 4, 2000
4. Fifth order Mock Theta Functions and their relations, International Conference on the Works of Ramanujan, University of Mysore, July 1-3, 2000
5. Certain Mock Theta Functions found in the 'Lost' Notebook, 66th conference of

Indian Mathematical Society held at Aurangabad, Dec, 2000

6. A Unified Mock Theta Function, International Conference on Special Functions and their Applications of S.S.F.A., India held at the Institute of Management & Development, Lucknow, Feb 2-4, 2001.
7. A basic Hypergeometric approach to Mock Theta Functions found in the 'Lost Notebook, Conference on Mathematics, 67th conference of Indian Mathematical Society held at Aligarh Muslim University, Aligarh, Jan 27-30, 2002.
8. On Functions associated with Mock Theta Functions, International Conference on Special Function and their Applications, Institute of Mathematical Sciences, Chennai. Sept. 23-27, 2002.
9. Certain q -functions associated with Mock Theta Functions found in the 'Lost' Notebook, 68th Annual Conference of Indian Mathematical Society, Shivaji University, Kolhapur, Dec. 20-23, 2002.
10. An infinite family of Mock Theta Functions, 4th Annual Conference of SSFA, University of Rajsthan, Jiapur. Feb. 20-22, 2003.
11. On an infinite family of Mock Theta Functions, 19th Annual Conference of RMS, BR Ambedkar Agra University, Agra, July 21-24, 2004.

Invited Talks

1. Symposium on Ramanujan, 87th Session of Indian Science Congress Association held at the University of Lucknow, Jan. 3-7, 2002.
2. Annual conference of the Society of Special Functions & their Applications held at Banaras Hindu University, Varanasi, March 4-6, 2002
3. Conference on Mathematics, University of Lucknow, Lucknow, Nov. 24-25, 2001.
4. 69th Annual Conference of Indian Mathematical Society, Dec. 26-29, 2003. University of Lucknow, Lucknow.
5. Conference on Special Functions and their Applications - the Fifth Annual Conference of SSFA, February 8 - 10, 2004, Lucknow.
6. National Conference on Advances in Mathematics and its Applications, ISMMS, February 13 - 15, 2004, Gorakhpur
7. 70th Annual Conference of Indian Mathematical Society, Dec. 26-29, 2004. J. N. Vyas University, Jodhpur.
8. 92nd Session of Indian Science Congress Association held at the Nirma University of Science & Technology, Ahmadabad, Jan. 3-7, 2005.

9. Sixth Annual Conference of SSFA, Jaunpur, June 7-9, 2005
10. 72nd Annual Conference of Indian Mathematical Society to be held at Rani Durgawati University, Jabalpur during Dec. 26-29, 2006.
11. National Symposium on Special Functions & their Applications, 12th Annual Conference of Vigyana Parishad of India, JN Vyas University, Jodhpur, October 25-27, 2007
12. International Conference of SSFA & Symposium on Applications of Special Functions in Engineering Sciences, MNIT, Jaipur, December 15-16, 2007
13. Fifth Annual Conference of Indian Society of Mathematics & Mathematical Sciences, Gorakhpur, February 22-25, 2008
14. Ramanujan Rediscovered, International Conference on Math & IT, IIT, Bangalore, June 1-5, 2009.
15. Workshop on Ramanujan's Work: December 22-23, 2009, National Academy of Sciences, Allahabd
16. Conference of Special Functions & their Applications, June 21-23, 2009, Jiwaji University, Gwalior
17. Symposium on Special Functions, Combinatorics & Number Theory, 98th Session of Indian Science Congress, SRM University, January 3 – 7, 2011
18. International Conference on Special Functions & Applications, J. N. Vyas University, Jodhpur, June 26-29, 2011
19. Symposium: Ramanujan – Yesterday & Today, 77th Conference of Indian Mathematical Society, SRTM University, Nanded, December 27-30, 2011.
20. International Conference on Special Functions & Applications, SVNIT, Surat, June 21-23, 2012
21. Conference on Ramanujan Mathematics, TD PG College, Jaunpur, Dec. 1-3, 2013
22. International Conference on Special Functions & Applications, MNIT, Jaipur, December 13-15, 2013
23. Annual Conference of Indian Mathematical Society, Rajgiri Institute of Science & Technology, Cochin, Dec. 28-31, 2013
24. Symposium on Ramanujan Mathematics, 29th Conference of Ramanujan Mathematical Society, Indian Institute of Science Education & Research, Pune, June 23 – 27, 2014
25. International Conference on Special Functions & Applications, Thapar University, Patiala, October 14-16, 2014

Research Project

Title of Project: A Study of q -identities associated with partial Mock Theta Functions

Position in Project: Principal Investigator

Project Duration: 2 years

Sponsor: Council of Science & Technology, U.P.

Books:

1. Matrix Theory, Publications Center, Lucknow, 1995
2. Differential Calculus & Vector Calculus, Unitech House, 2004
(Jointly with Deepti Singh, Pratibha Shukla, J P Singh)
3. Advanced Calculus, Unitech House, 2004
(Jointly with MM Mishra, Pratibha Shukla, N K Shukla)

Lecture Notes (Unpublished)

1. Functions of Complex Variables
2. Graph Theory

No. of Ph. Students: 2 (Perusing)

Teaching: 27 years

Awards & Honors

1. Fellow, Institute of Mathematics & its Applications, U. K.
2. V. M. Shah Prize of year 2000 by Indian Mathematical Society.
3. Delivered R. P. Agarwal Memorial Lecture, Mathematics Day, December 22, 2010, Agra University, Agra
4. Sectional Recorder, Mathematical Sciences Section, Indian Science Congress (2010 - 2012)
5. Assistant Secretary, Society for Special Functions and their Applications, India.
6. Member, Sectional Committee of Mathematical Sciences Section, Indian Science Congress (2005-06).
7. Council Member, Indian Mathematical Society (2013-16).

Visits Abroad/Summer Schools and Workshop Attended

1. Arithmetic & Geometry Around Hypergeometric Functions, UNESCO-CIMPA Summer School, Galatasaray University, Istanbul (Turkey), June 13-25, 2005.
2. School on Modular Forms & Mock Modular Forms, Feb. 28-March 12, 2011,

- International Center for Theoretical Physics, Trieste, Italy.
3. International Conference on Modular Forms & Mock Modular Forms, March 14-18, 2011, International Center for Theoretical Physics, Trieste, Italy.
 4. Hypergeometric series and their generalizations in algebra, geometry, number theory and physics, May 29 – June 1, 2012, Institute Henri Poincaré, Paris, France
 5. Workshop on Hype & q Hype, Institute of Mathematical Sciences, Chennai, September 15-19, 2001

Associations & Other Academic Activities

1. Reviewer, Mathematical Reviews, American Mathematical Society, USA. ,
2. Reviewer, Zentralblatt Math, European Mathematical Society, Germany.
3. Associate Editor, South East Asian Journal of Mathematics,
4. Member, Editorial Boards, Computational Research
5. Member, Editorial Boards, Bulletin of Pure & Applied Mathematics (2008-2012),
6. Member, Editorial Boards, International Journal of Special Functions & Applications,
7. Member, Editorial Boards, Proceedings of the Fifth Annual Conference of the Society for Special Functions and their Applications, University of Rajasthan, Jaipur.
8. Memberships: Indian Mathematical Society, Indian Mathematical Academy, Society for Special Functions and their Applications, Bharat Ganit Parishad, Rajasthan Ganita Parishad, Indian Society for History of Mathematics, UP Association for Advancement of Science and Technology, Indian Science Congress Association, Calcutta Mathematical Society, Indian Society of Mathematics & Mathematical Sciences, Ramanujan Mathematical Society.
9. Regional Coordinator (Lucknow region), National Mathematical Olympiad, Delhi, 2003-07.

Other Administrative Responsibilities in During My Services in College/University

1. Dean, School of Applied Sciences, Babu Banarasi Das University
2. Head, Department of Mathematics, Babu Banarasi Das University
3. Director, Internal Quality Assurance Cell, BBDU
4. Incharge, Web Cell, Babu Banarasi Das University
5. Head, Division of International Affairs & Academic Planning, Babu Banarasi Das University (2011-February2015)
6. Coordinator, Ph D. Program, Babu Banarasi Das University

7. Convener, Committee for Implementation of Credit Based Semester and Grading System, Babu Banarasi Das University
8. Chair, Board of Studies, Department of mathematics
9. Chair, Research Degree Committee, School of Applied Sciences, Babu Banarasi Das University
10. Member, Research Degree Committee, School of Computer Applications, Babu Banarasi Das University
11. Member, Examination Committee, Babu Banarasi Das University
12. Member, Flying Squade, Babu Banarasi Das University
13. Incharge, Science Association, Amiruddaula Islamia Degree College, Lucknow
14. Incharge, Maintenance Division, Amiruddaula Islamia Degree College, Lucknow
15. Ex-Officio Member, Managing Committee, Amiruddaula Islamia Degree College, Lucknow (for two term)
16. Assistant Superintendent of Examination, Amiruddaula Islamia Degree College, Lucknow (2002-2008)
17. Proctor, Science Faculty, Amiruddaula Islamia Degree College, Lucknow
18. Head, Department of Mathematics, Amiruddaula Islamia Degree College, Lucknow
19. Member, Editorial Board, College Magazine, Amiruddaula Islamia Degree College, Lucknow

Personal Details

Father's Name : Mr. Syed Ali
Date of Birth : July 1, 1967
Marital Status : Married
Residence Address: 292, Chandralok, Aliganj, Lucknow 226 024, Uttar Pradesh, India
Tel. +91 522 391 1065 (off.), 2323905 (res.), 9415583389 (Cell)
Email: ali.sahmad@yahoo.com, ali.bbdu@gmail.com