Dr. Swadesh Kumar Sahoo

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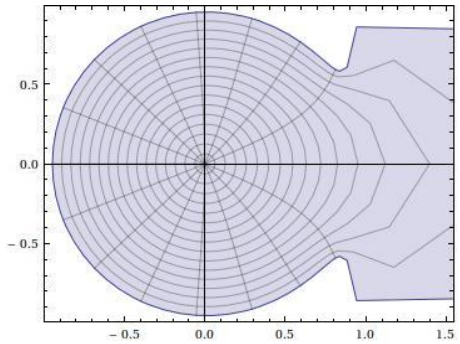
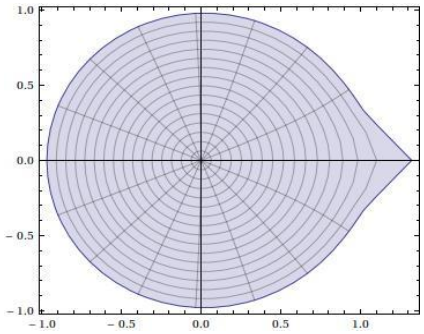
We consider basic hypergeometric functions introduced by Heine. We study the geometric properties of certain quotients of basic hypergeometric functions having shifted parameters and show that they map the domains of analyticity into domains convex in the vertical direction. Computational framework in this research demonstrates to generate special functions having interesting geometric properties. Further work in this direction will certainly bring a strong foundation between q-theory and geometric function theory.





Baker and Coon have successfully utilized basic hypergeometric functions in a series of papers (appeared in *Physical Review* D) on particle physics. Also, Van Kampen has applied basic hypergeometric functions to fluctuations in an electric circuit consisting of a condenser and a diode.

S. Agrawal and S. K. Sahoo, Geometric properties of basic hypergeometric functions, *Journal of Difference Equations and Applications*, Vol. 20, No. 11, 1502-1522 (2014).

Dr. Sk. Safique Ahmad

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Areas of Research: Perturbation on nonlinear Eigenvalue problems, Multiparameter eigenvalue problems, Quaternionic eigenvalue problems

List possible applications of the result: Problems arise in the stability analysis of single delay differential equations, finite element simulation of mechanical problems

Publication details for this result:

1. Backward errors for eigenvalues and eigenvectors of Hermitian, skew-Hermitian, H-even and H-odd matrix polynomials, 2013 (61), pp. 1244-1266 (With V. Mhermann)

2. Perturbation anlaysis for complex symmetric, skew symmetric, even and odd matrix polynomials, 2011 (38) pp: 275-302 (With V. Mhermann)

3. Backward errors and pseudospectra for structured nonlinear eigenvalue problems (With V. Mhermann)(Under revision)

Dr. V Antony Vijesh

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Existence and uniqueness theorem for nonlinear equations via quasilinearization and its applications to various types of equations including fractional order differential equations. Developing numerical methods for differential equations based on spectral method and wavelet method.

Varun Joshi, R.B. Pachori, and Antony Vijesh: Classification of ictal and seizurefree EEG signals using fractional linear prediction, Biomedical Signal Processing and Control, 9 (2014), 15.

Dr. Anand Parkash

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Dr. Anand Parkash is working on Prime Submodules and Radical Formulae. For commutative rings with unity, intersection of all prime ideals is equal to the set of all nilpotent elements and it is called the radical formula for rings. Prime submodules are generalization of prime ideals and some radical formulae have been defined for modules. Recently, he has find a necessary and sufficient condition for a local domain of dimension one to satisfy the radical formula.

A. Parkash, One dimensional local domains and radical formula, Beiträge zur Algebra und Geometrie, to appear, DOI 10.1007/s13366-014-0189-3.

Dr. Niraj Kumar Shukla

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Wavelets in the separable Hilbert spaces are functions that are used to produces bases or frames by the translates and dilates of a single function. Orthonormal bases and frames are widely used in applications such as signal processing, sampling theory, etc. To describe wavelets in the nonuniform discrete setting, first we find a necessary and sufficient condition of an orthonormal bases for a square summable separable Hilbert space on the spectrum and then show that the Hilbert space can be expressed as an orthogonal decomposition in terms of countable number of its closed subspaces.

N.K. Shukla and S. Mittal, wavelets on the Spectrum, Numer. Funct. Anal. Optm., 35(4)(2014), 461-486.

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Updates in a knowledge base, given as an information system in rough set theory, may need to be made due to changes in (i) the set of attributes, (ii) attribute-values, or (iii) the set of objects (instances). We proposed a logic for information systems which incorporates all these three aspects of updates. The logic can capture the flow of information as well as its effects on the approximations of concepts.

Khan, M. A., Banerjee, M. and Rieke, R.: An Update Logic for Information Systems. **International Journal of Approximate Reasoning, 55**, 436-456, Elsevier.

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Radon transform for the functions in L^p spaces is defined for the range $1 \leq p < p_0$, for some fixed p_0. But if we restrict to subclass of radial functions on Lorenze space $L^{p_0,1}$, then the Radon transform is not only defined but turns out to be a bounded mapping also.

This result opens the possibility of reconstructing back the functions in the end-point Lorentz spaces from its Radon transform on non-Euclidean spaces.

End point estimates for Radon transform of radial functions on Non-Euclidean spaces, Monatsh. Math., 174, (2014), no. **1,** pp. 41-75. (with Swagato K. Ray)