Rational approximations on the unit disk using Zernike–Blaschke functions

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The (basic) Zernike functions [5] are often used to express wavefront data on optical tests, since they are made up of terms that are of the same form as the types of aberrations often observed in these tests [4]. In [2], a discrete orthogonality property was introduced for these polynomials on a suitable set of points, constructed from the roots of Legendre polynomials.

In a recent paper [1], using the so-called Blaschke functions (which can be identified with the congruence transformations on the Poincaré disk model of the Bolyai–Lobachevsky hyperbolic geometry [3]), constructions of complete orthonormal systems were introduced on the disk based on the Zernike functions.

In this talk, we show that these new systems of rational Zernike functions have similar types of discrete orthogonality properties on suitably constructed sets of points, and investigate some approximation problems and methods corresponding to the continuous and discrete Zernike–Blaschke–Fourier series of functions.

References

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