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Weyl group orbit functions and their remarkable properties

Several families of multivariable special functions, called orbit functions, are defined in the context of Weyl groups of compact simple Lie groups/Lie algebras. They are closely related to the irreducible representations of Lie groups and to Jacobi polynomials. In this talk we will summarize their most significant properties, namely their symmetries with respect to the affine Weyl group and continuous orthogonality. This allows us to define continuous Fourier-like transforms. Moreover, it is shown that each orbit function is an eigenfunction of the Laplace operator and the eigenvalues are know explicitly.