

Abstract: A probability distribution is called spherically symmetric if it is invariant with respect to rotations about the origin. This class includes the multivariate standard normal distribution, a multivariate extension of the t -distribution and uniform distributions inside the unit ball or the unit sphere surface. The first part of the thesis summarizes the basic properties of spherically symmetric distributions such as the form of their characteristic function and provides expressions for their moments and the density function. It turns out that spherically symmetric distributions are fully characterized by the distribution of their Euclidean norm or by any of their univariate marginal distributions.

As any marginal distribution of a spherically symmetric distribution is also spherically symmetric, the aim of the second part of this thesis is to study the inverse relationship using fractional calculus. For a given n -dimensional spherically symmetric distribution we solve the problem of deciding whether there is a spherically symmetric distribution in higher dimensions whose n -dimensional marginal is as given.