

The thesis deals with a new approach to construction of confidence regions for multivariate random variables and multivariate random samples. This can also be viewed as one of the possible generalizations of the notion of quantile into a multidimensional case. The approach is based on the following: in the first step, a centred random vector is transformed into polar (hyperspherical) coordinates. Afterwards, so-called directional quantiles are determined. These are classical unidimensional quantiles for distribution of the radius conditional on the angle of the polar coordinates. Sample analogy of the directional quantiles is estimated using trigonometrical series with coefficients obtained by quantile regression.

The first chapter deals with the choice of the origin for the centralization of the data. We examine both theoretical and sample cases. We offer several variants with focus on the deepest point. The second chapter concerns quantile regression with focus on the aspects, which have an impact on the properties of sample periodical regression quantiles.

The third and most exhaustive chapter is devoted to periodical regression quantiles construction and properties. Both theoretical and sample variants and their relationship are described. Several examples are offered in the end of the chapter.