Sharp L_p-error estimates for sampling operators

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We study approximation properties of linear sampling operators in the spaces L_p. By means of the Steklov averages, we introduce a new measure of smoothness containing simultaneously information on the smoothness of a function in L_p and discrete information on this function at sampling points. The new measure of smoothness enables us to improve and extend several classical results of approximation theory to the case of linear sampling operators. In particular, we obtain matching direct and inverse approximation inequalities for sampling operators in L_p, find the exact order of decreasing of the corresponding L_p-errors for particular classes of functions, and introduce a special K-functional and its realization suitable for studying smoothness properties of sampling operators. In this talk, we will present some of these results in the case of approximation of functions by trigonometric Lagrange interpolation polynomials.