ON THE EIGENFUNCTIONS OF THE LAPLACIAN, SOBOLEV SPACES AND FRACTIONAL REGULARITY FOR DEGENERATED EQUATIONS

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We prove that the eigenfunctions of the Laplace operator form a Markusevic basis for the Sobolev space $W_0^{1,p}(\Omega)$ for all $p \geq 2$. As a consequence, the closure of the linear span of these eigenfunctions coincides with $W_0^{1,p}(\Omega)$, what can be used to prove both existence and regularity results for several kinds of partial differential equations. We apply our result to obtain fractional regularity for a degenerate equation.