Abstract

For a given $p > 1$ and an open bounded convex set $\Omega \subset \mathbb{R}^2$, we consider the minimization problem for the functional $J_p(u) = \int_\Omega \big(\frac{1}{p}|\nabla u|^p - u\big)$ over $W_0^{1,p}(\Omega)$. Since the energy of the unique minimizer u_p may not be computed explicitly, we restrict the minimization problem to the subspace of *web functions*, which depend only on the distance from the boundary $\partial\Omega$. In this case, a representation formula for the unique minimizer v_p is available. Hence the problem of estimating the error one makes when approximating $J_p(u_p)$ by $J_p(v_p)$ arises. When Ω varies among convex bounded sets in the plane, we find an optimal estimate for such error, and we show that it is decreasing and infinitesimal with p. As $p \to \infty$, we also prove that $u_p - v_p$ converges to zero in $W_0^{1,m}(\Omega)$ for all $m < \infty$. These results reveal that the approximation of minima by means of web functions gains more and more precision as convexity in J_p increases.