

REGULARITY ESTIMATES FOR ELLIPTIC BOUNDARY VALUE PROBLEMS WITH SMOOTH DATA ON POLYGONAL DOMAINS

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ABSTRACT. We consider the model Dirichlet problem for Poisson's equation on a plane polygonal convex domain Ω with data f in a space smoother than L^2 . The regularity and the critical case of the problem depend on the measure of the maximum angle of the domain. Interpolation theory and multilevel theory are used to obtain estimates for the critical case. As a consequence, sharp error estimates for the corresponding discrete problem are proved. Some classical shift estimates are also proved using the powerful tools of interpolation theory and multilevel approximation theory. The results can be extended to a large class of elliptic boundary value problems.

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