

REGULARITY ESTIMATES FOR SOLUTIONS OF THE EQUATIONS OF LINEAR ELASTICITY IN CONVEX PLANE POLYGONAL DOMAINS

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ABSTRACT. The Dirichlet problem for the plane elasticity problem on a convex polygonal domain is considered and it is proved that for data in L^2 the H^2 regularity estimate holds with constants independent of the Lamé coefficients.

1. INTRODUCTION

A regularity estimate for the Stokes problem on convex polygonal domains was proved by Kellogg and Osborn in [5]. Shift estimates for the biharmonic Dirichlet problem on polygonal domains in terms of fractional Sobolev norms are proved for example in [2], [4]. Based on the results from the biharmonic Dirichlet problem we will see in the next section that if the data for the Stokes problem are smoother than L^2 , then the solution (\mathbf{u}, p) of the Stokes problem on a convex polygonal domain belongs to a space smoother than $H^2 \times H^1$ and a corresponding shift estimate holds. In the third section a result of Arnold, Scott and Vogelius [1] concerning regular inversion of the divergence operator is used to reduce the elasticity problem to that of the Stokes problem. This is combined with the regularity estimate obtained for the Stokes problem in order to get a regularity estimate for the Dirichlet plane elasticity with constants independent of the Lamé coefficients.

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