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ON THE ROBIN PROBLEM FOR THE EQUATIONS OF THIN PLATES

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ABSTRACT. The boundary integral equation method is used to investigate the Robin problem in a theory of bending of thin plates. Difficulties arising from the application of classical techniques from three-dimensional elasticity are overcome with the use of a modified single layer potential. In addition, the exterior problem is solved in a class of matrix-functions allowing for the possibility of divergence at infinity.

1. Introduction. The use of integral equation methods in elasticity is well-documented (see, for example, [**3**] and [**2**]). In particular, Dirichlet and Neumann problems for the equations of bending of thin plates with transverse shear deformation, have been solved in [**1**]. Here, solutions are sought in special classes of finite energy matrix-functions in order to overcome the difficulties associated with the application of classical techniques from three-dimensional elasticity. These difficulties can be attributed to the rapid growth at infinity of the matrix of fundamental solutions associated with the plate equations.

In this paper we consider a Robin problem in the same theory of thin plates. Here, a specific linear combination of stresses and displacements is prescribed on the boundary of the plate. Classical techniques [**4**] again fail to accommodate both the interior and exterior problems. We overcome these difficulties with the use of a modified single layer potential and results developed in [**1**].

2. Preliminaries. In what follows, Greek and Latin suffixes take the values 1, 2 and 1, 2, 3, respectively, we sum over repeated indices $\mathcal{M}_{m\times n}$ is the space of $(m\times n)$-matrices, E_n is the identity element in $\mathcal{M}_{m\times n}$, a superscript T denotes matrix transposition and $(\dots)_{,\alpha} = \partial(\dots)/\partial x_\alpha$. Also, if X is a space of scalar functions and ν a matrix $\nu \in X$ means that every component of ν belongs to X.

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